THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The year opens with a most encouraging outlook in the iron trade. While anticipation of prosperous conditions in 1905 has already figured prominently in the market, both in tonnage and in price advances, there are good reasons for expecting tangible evidences early in the year, that consumption is to be maintained on a considerable level above the record for 1904. Railroad buying has been good, but the expectations of the iron trade are set on a much larger volume of business from that source, in view of the plans for offering in the near future some hundreds of millions of bonds, estimates running as high as one billion. With the crops of 1904 valued at $1,400,000,000, or about $400,000,000 more than for the preceding year, the financial world is not staggered by these plans of the railroads, and the iron trade has history for its guaranty that much of the proceeds of all such security issues will be invested in the products of mills and metal-working shops.

In sharp contrast with the opening of 1904, when pig iron consumption was at the rate of 10,000,000 to 11,000,000 tons a year, the first week of 1905 finds consumption at a yearly rate above 19,000,000 tons, or greater than has been maintained for any single year. And at that the industries depending upon blast furnaces and rolling mills are not operating at the capacity quite certain to be engaged when the season of outdoor work opens.

The feature of the week in pig iron is that while as a rule buyers are not now in the market, several large consumers have been willing to contract. In the closing days of the old year a considerable tonnage of basic and low-phosphorus pig iron was placed with Eastern furnaces, in addition to several large lots of foundry iron, and in the Central West a few large consumers have been buyers of foundry and malleable pig iron. In the Chicago district local furnaces are quoting higher prices, and there is a disposition on the part of some Southern furnaces to advance quotations, in the face of the advantage Northern furnaces already have. The Southern coke supply does not increase in the way that it must if more furnaces are to blow in. In the Central West, merchant furnaces making iron for steel works are all active but one and the Steel Corporation will follow up the blowing in of the Neville Island stack by the early starting of two Donora furnaces.

Higher raw materials are absorbing no small fraction of the advances furnacemen have secured recently. Even with the record output of the Connellsville region, furnace coke has now advanced to $2.60 for the first half of this year and $3 has been paid on prompt shipments. Furnaces are making strenuous efforts to accumulate a stock against the car troubles that always increase with the winter's advance. The Lake Superior ore situation has been canvassed in the past week at a meeting of the merchant interests. There will be no association in 1905, but sales already made have established the following as the basis which promises to be maintained for standard ores in the coming season: Old range Bessemer, $3.75; old range non-Bessemer, $3.25; Mesabi Bessemer, $3.50; Mesabi non-Bessemer, $3.00.

The rail orders thus far booked for 1905 are upwards of 700,000 tons, of which 250,000 tons is reported from the Chicago district. The mill at Ensley, Ala., is already full for the year and has lately refused business for 1905 delivery. With a further advance in light rails the re-rolling mills are better able to do business, but the price of re-rolling rails holds up also and is a great handicap. The only advance of the week is in merchant pipe, averaging about $1 a ton. It is significant that 1904 was a record year in output of wrought pipe—a circumstance that is not alone in indicating that the past twelvemonth has not been as unsatisfactory to some portions of the trade as the general impression would have it. Tin plate mills made a large output in 1904, but, as is well known, profits were not what they might have been.

The generally full operation of mills and steel works through the holiday period is its own commentary on current conditions. Lighter products, as was the case throughout 1904, are keeping well up in production records, while in the heavier forms of finished steel there is now a very good backlog for 1905—a larger tonnage ahead than in nearly two years.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, Jan. 4.

Not since 1902 has a new year opened with brighter prospects for the iron and steel trade. Consumption in nearly all lines is at a record rate for the opening of a year, and the probabilities are that all tonnage records will be broken in the next twelve months. Owing to the holiday season the market has been quiet during the past ten days, but the outlook is bright for an early resumption of buying, consumers of pig iron and many kinds of finished material already showing a disposition to cover through the first half. A few local foundries have already covered through June at $17.10 Pittsburg, and in some cases higher for No. 2, while Bessemer is firm at $16.25 at the furnace for any delivery. Southern iron is firm at $13.50 Birmingham, for No. 2, but owing to the

difference in price in favor of the Northern product, there is little demand for Southern except where required for a mix.

The year opens with nearly as large a rail tonnage booked as at this period last year, when a large amount was carried over, while the outlook for heavy buying during the next two months on the part of the railroads is bright. Steel car works are engaged at their utmost capacity, the two companies in this district having orders on their books for approximately 30,000 cars. The heavy buying of cars insures a continued heavy tonnage for the plate mills, most of which are engaged at present, although the boiler and tank manufacturers are still backward with new orders. On steel bars all the large buyers are covered through the first half, while the iron mills are not anxious for future business, taking full advantage of the high prices now prevailing. Pipe production last year shattered all records, and the mills are beginning the new year with heavy tonnages on their books despite the winter season. There is also a revival of new enterprises which will result in much new work during the year, the rolling mill machinery manufacturers in this district already having large orders on their books.

The constantly increasing demand for both furnace and foundry coke has resulted in establishing new high prices, prompt furnace coke being quoted at $3, while for shipment through the first half $2.60 has been paid. Foundry coke for first half delivery is held at $3.25. The coke market continues to advance in the face of an increasing production which promises to exceed all records of the Connellsville region. The recent rains have replenished the water supply and the operations are no longer handicapped from this source. The car supply however continues bad and with continued cold weather will become worse. The railroads are new putting forth every effort to relieve the situation, but few of the roads having added to their equipment during the year, no improvement can be looked for during the remainder of the winter months, while the traffic managers of some of the largest roads entering this territory anticipate the greatest freight congestion this district has yet seen.

Yesterday merchant pipe was advanced ½ point or $1 a ton, while boiler tubing was reduced two points. The McClintic-Marshall Construction Co. has taken several large structural contracts totaling 8,000 tons. Another advance has also been made in light rails, and prices are reaching a point where the small independent rerolling mills can again afford to compete. The Pennsylvania Railroad Co. has placed an order with the Baldwin Locomotive Works for 300 locomotives, making a total of 325 ordered from this concern for delivery this year, while 200 additional locomotives will be built during the vear in the railroad company's Juniata shops.

Pig Iron.—The two Donora furnaces of the Carnegie Steel Co. will be in operation this week, while only one of the 16 furnaces of the Bessemer pig iron association is idle. Iron is being made in this and the Valley districts at an unprecedented rate and the fact that there are no stock accumulations is ample proof that it is going into rapid consumption. There has been some buying of No. 2 during the week for delivery through the first quarter and the first half. This iron was sold on the basis of $16.25 to $16.50 furnace. Bessemer iron for any delivery is held at $16.25 furnace, but there has been little buying during the week. Southern No. 2 is firm at $13.50 Birmingham. Northern forge is strong at $16.35 to $16.50 Pittsburg. We make the following quotations:

Bessemer, Valley	$16 10 to 16 25
Bessemer, Pittsburg	16 95 to 17 10
No. 1 Foundry	18 00 to 18 25
No. 2 Foundry	17 35 to 17 85
Gray Forge, Pittsburg	16 35 to 16 50
Basic, Valley	15 75 to 16 00
Basic, Pittsburg	16 60 to 16 85

Steel.—Premiums ranging from $2 to $3 a ton are being paid on billets and bars for delivery through the first quarter, while for delivery the first half premiums range from $1 to $1.50. There has been little buying through the week, however. We make the following quotations of official prices: Bessemer and open-hearth billets, 4 x 4 in., and slabs, up to and including 0.25 carbon, $21, f. o. b. mill, Pittsburg, with actual freight to points of delivery; 0.26 and including 0.60 carbon, $1 advance, 0.61 to 1.00 carbon, $2 advance. Billets smaller than 4 x 4 in., $2 advance; sheet and tin bars, $23; cut bars, $23.50; forging billets, $23. Bessemer and open-hearth steel rods are held at $30.50 to $31.

Rails and Track Material.— Rail mills have orders on their books for close to 700,000 tons for delivery this year, while additional large orders are pending. Light rails have again been advanced $1 a ton and the early resumption of a large number of the rerolling mills is looked for. We make the following quotations: Fifty lb. and over 500 tons, $28; car lots and less than 500 tons, $30; less than car lots, $32; light rails, 16-lb., $26 to $27; 20 lb., $25 to 26; 25 to 45 lb., $23 to $24. Angle bars, 1.25c; spikes, 1.65c to 1.70c.

Ferro-Manganese.—We quote domestic ferro, 80 per cent, at $46 delivered in carload lots at buyer's mill, any point east of the Mississippi.

Muck Bar. –There have been no transactions in muck iron during the week and prime bars are held at $28.25 to $28.50 Pittsburg.

Skelp.—The skelp market is quiet but firm. Grooved iron is held at 1.70c to 1.75c, and sheared at 1.80c. Grooved steel is held at 1.50c to 1.55c and sheared at 1.60c to 1.65c.

Plates.—All the plate mills in this district report heavy specifications from the steel car plants in this vicinity. The Allegheny plant of the Pressed Steel Car Co. is now operating in full for the first time in a year. We quote as follows: Tank plates, ¼ in. thick, 6¼ to 14 in., inclusive, 1.40c f. o. b. mill Pittsburg; over 14 in. up to 100 in., 1.50c. Extras are as follows per lb.; Flange and boiler steel, 10c; marine, A. B. M. A., and ordinary fire box, 20c; still bottom, 30c; locomotive fire box, 50c; plates over 100 in. up to 110 in width, not less than 5c per 100 lb. extra; plates 110 in. to 115 in. wide, not less than 10c extra; 115 to 120 in., 15c extra; plates 120 in. to 125 in. wide, not less than 25c extra; plates, 125 in. to 130 in., not less than 50c extra; plates 130 in. wide, not less than $1 extra; plates 3-16 in. thick, $2 extra; gauges 7 and 8, $3 extra; No. 9, $5 extra. Five cents extra for less than carloads. Terms net cash in 30 days, and for all points of delivery in the United States except the Pacific Coast.

Structural Material.—The McClintic-Marshall Construction Co. has received the following orders: D. L. & W. R. R., bridges, 5,000 tons; N. Y. C. & H. R. R., telegraph poles, 1,500 tons; Pennsylvania company, Chicago track elevation, 1,500 tons. We quote: Beams and channels up to 15 in., 1.50c; over 15 in., 1.60c; angles, 3 x 2 up to 6 x 6, 1.50c; zees, 1.40c; tees, 1.55c; angles from 3 to 16 in., 1.50c; universal and sheared plates, 6¼ to 14 in., inclusive, 1.40c; over 14 in., 1.50c base.

Bars.—Specifications on steel bar contracts are unusually heavy and all the local mills are operating in full. Demand for iron bars also continues heavy, although prices have not been changed during the week. We make the following quotations: Bar iron, 1.65c to 1.69¼c Pittsburg; hoops, 1.55c, and bands, 1.40c, both taking bar extras. Bessemer steel bars, 1.40c; open-hearth steel bars, 1.40c; plow and cultivator beams, 1.40c, net; channels, angles, zees and tees, under 3 in., 1.50c. The following differentials are maintained on steel: Less than 2,000 lb. of a size and not less than 1,000 lb., 10 cents advance; less than 1,000 lb. of a size, 30 cents advance.

Sheets.—Demand for sheets continues heavy and the mills are having no difficulty in securing business at the advanced prices. Both the mills of the independents and the American Sheet & Tin Plate Co. are operating as they never did before and the consumption is at a tremendous rate. We quote as follows on black sheets, 500 bundle lots and over: No. 30, 2.70c; No. 29, 2.60c; No. 28, 2.30c; No. 27, 2.20c; Nos. 25-26, 2.15c; Nos. 23-24, 2.10c; Nos. 18-20, 2.05c; No. 16, 2c; Nos. 12-14, 1.95c; No. 9, 1.90c; No. 8, 1.85c. Galvanized: No. 30, 4.25c; No. 29, 3.75c; No. 28, 3.35c; No. 27, 3.15c; Nos. 25-26, 2.95c; Nos. 23-24, 2.75; Nos. 18-20, 2.60; No. 16, 2.45c.

Pipes and Tubes.—On January 3, merchant pipe was advanced ½ point, amounting to $1 a ton, while a reduction of two points was made in boiler tubing. The pipe mills have large tonnages on their books despite the unfavorable season, and if the present rate of consumption continues through the year, last year's record, the best yet made, will be broken. Discounts to consumers, carload lots, f. o. b. Pittsburg, plus freight to destination according to Tube Rate Book, are revised as follows:

MERCHANT PIPE.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛ and ¼ inch	68½	52½	66½	50½
⅜ to 6 inches	76½	66½	75	65
⅜ and ½ inch	72½	60½	70½	58½
7 to 12 inches	71½	56½	70	54½
Extra Strong Plain Ends.				
⅛ to ¾ inch	61½	49½	59½	47½
⅛ to 4 inches	65½	56½	66½	54½
4½ to 8 inches	64½	52½	62½	50½
Double extra strong plain ends, ½ to 8 inches	57½	46½	55½	44½

MERCHANT BOILER TUBES, LESS CARLOADS, 22 FEET AND UNDER.

	Steel.	Iron.
1 to 1½ inches	48	45
1¾ to 2¼ inches	60	45
2½ inches	62	50
2¾ to 3 inches	68	57½
6 to 13 inches	60	45

Wire and Wire Nails.—An advance in all kinds of wire products is looked for but as yet has not been announced. Demand for wire products is heavy, and jobbers have closed large contracts for their requirements during the next 60 days. We make the following quotations: Wire nails, jobbers' carload lots, $1.75; retailers' carloads, $1.80; and less than carloads, $1.90; painted barb wire, $1.90 to jobbers in carloads; retailers' carloads $1.95 and less than carloads, $2.05, with 30 cents for galvanizing. Annealed smooth fence wire is held at $1.60, with the usual differentials to retailers for carloads and less than carloads. Quotations are all f. o. b. Pittsburg, 60 days, with 2 percent discount for cash in ten days. Iron cut nails are held at $1.85 Pittsburg, and steel at $1.75.

Merchant Steel.—All of the mills producing high grade steel in this district are operating in full and report a continued heavy demand. The shafting market is also improving but prices remain unchanged. We quote: Cold rolled and ground shafting, 52 percent off in carload lots, and 47 off in less than car lots, delivered in base territory; tire steel, 1.60c to 1.65c; open-hearth spring steel, 2c to 2.10c; sleigh shoe, flat, 1.55c to 1.60c; smooth finished machinery steel, 1.60c; toe calk, 1.95c to 2c.

Old Material.—The market is quiet, but prices are firm and dealers are looking for further advances. We make the following quotations, gross tons: Heavy melting stock, $16.50 to $17; low phosphorus stock, $20 to $20.50; No. 1 cast scrap, $15 to $15.50; cast iron borings, $10.50 to $11; No. 1 wrought, $17.50 to $18, net tons; rerolling rails, $16.50 to $17.

Coke.—Furnace coke for prompt shipment is held at $3, while for delivery through the first half $2.60 has been paid. Foundry coke is firm at $3.25, and as high as $3.50 is asked. The car supply is bad in the Connellsville region and no improvement can be looked for the remainder of the winter season. During the week ending Saturday, Dec. 24, the production of the upper region was estimated at 234,594 tons, while the lower region produced 69,788 tons.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, Jan. 3.

Strength is the keynote of the local iron and steel market. The advent of the new year finds all prices held firmly, with indications in some products of early advances. Buying during the holiday season has shown a natural cessation, but the subsidence was not of a nature to worry manufacturers. Having in mind a possible repetition of the events of 1902, some consumers are asking producers to anticipate shipments, that they might feel secure. Others are placing supplementary orders and paying premiums to get the material shipped promptly. On all sides a desire is shown to get increased stocks on hand, giving the market at the opening of the year a buoyancy it has not possessed in many weeks. The only product that has been advanced in the week under review is merchant pipe, which has been put up $1 a ton. Pig iron is wavering between its present price and a basis 25 to 50 cents higher. Northern producers now maintain the $17.50 schedule, and while $13.50 is the usual price for Southern iron some leading brands are held at $13.75 for delivery in the first quarter. Forging and axle billets are scarce, local prices ranging from $1 to $4 above association values, according to the desirability of the order and deliveries required. Contracts for heavy rails have been placed with local interests in fairly large volume since the reaffirmation of prices, the Illinois Steel Co. having on its books at the present time orders aggregating 250,000 tons, all for this year's delivery. Other materials are without noteworthy change.

Pig Iron.—Since the first of the year, all the Northern furnaces have advanced their prices to the basis of $17.50 Chicago for No. 2 foundry, and this price is now quoted on all lots for delivery in the first quarter. Southern furnaces appear also to be considering higher prices. On inquiries that have emanated from this territory for early deliveries, Southern quotations have been in some cases 25 to 50 cents above the $13.50 Birmingham schedule, and it is made evident to the melter that the furnace is not particularly anxious to get his business. There are indications that unless the coke shortage in the South is overcome soon there will not be the usual proportion of Southern irons on the market a few weeks hence. High silicon irons are also very scarce, and the $2 advance of ten days ago in Jackson County silveries has been well sustained. Lake Superior charcoal is also higher, being now quoted at $18.50 Chicago. We have revised our prices and quote as follows:

Lake Superior Charcoal	$18 50 to 19 00
Northern Foundry No. 1	18 00
Northern Foundry No. 2	17 50
Northern Foundry No. 3	17 00
Northern Scotch Foundry	17 50
Ohio Strong Softeners No. 1	19 30 to 19 80
Ohio Strong Softeners No. 2	18 30 to 18 80
Southern Foundry No. 1	17 65 to 17 90
Southern Foundry No. 2	17 15 to 17 40
Southern Foundry No. 3	16 65 to 16 90
Southern Foundry No. 4	16 40 to 16 65
Southern No. 1 Soft	17 65 to 17 90
Southern No. 2 Soft	17 15 to 17 40
Southern Gray Forge	16 15 to 16 40
Southern Mottled	16 15 to 16 40
Southern Silveries (4% to 6% Silicon)	18 65 to 19 15
Jackson Co. Silveries (6% to 8% Silicon)	20 30 to 22 30
Jackson Co. Silveries (8% to 10% Silicon)	22 30 to 23 80
Alabama and Georgia Car Wheel	20 15
Malleable Bessemer	17 50
Basic Iron	18 15

Billets.—Forging and axle billets are in good demand in this market, and a fair sized tonnage has been placed on mill books in the week. Mills are well sold up and are not eager for new business. Association prices are entirely ignored in this market, the minimum at which producers will consider new business being $1 above these values, ranging to still higher prices, according to the size of the order and delivery required. We have revised our prices and quote carload lots, Chicago deliveries, as follows: Forging billets,

4 x 4 and larger, up to but not including 10 x 10, up to .25 carbon, $27; up to and including .60 carbon, $1 extra. Re-rolling billets, Bessemer or open-hearth, 4 x 4 and larger, $25; billets, 3⅞ in. and smaller, and sheet and tin bars, $27. Wire rods, $32 Pittsburg.

Bars.—Several supplementary orders have been placed with manufacturers of steel bars at the new prices. The total, however, is not of large proportions, inasmuch as consumers generally covered in ample proportions for their wants this year several months ago. Specifications continue large, and the entire output of mills goes into immediate consumption. Bar iron remains strong at 1.65c Chicago. Buying has been light during the holiday season, but has picked up considerably since the first of the year. We quote carload lots, mill shipments, Chicago delivery, as follows: Bar iron, 1.65c to 1.70c; Bessemer and open-hearth bars and bands, 1.56½c base, half extras; soft steel angles, less than 3 x 3, 1.76½c; hard steel angles, 1.60c; hoops, 1.71½c base, full extras. Store quotations are strong, and we quote on lots from warehouse stocks, as follows: Bar iron, 1.90c to 2c base, full extras; soft steel bars and bands, 1.75c to 1.85c base, half extras; soft steel angles, channels and tees, 1.85c to 1.95c; hoops, 2c to 2.10c base, full extras.

Sheets.—There is an excellent demand for all gauges in black and galvanized sheets, the new prices being well sustained. Many of the smaller interests are sold up for the next three months and have withdrawn from the market. Specifications are brisk, contract quotas being anticipated in many instances. We quote carload lots, mill shipments, Chicago delivery, as follows: Blue annealed sheets, Nos. 9 and 10, 1.81½c to 1.86½c; Nos. 11 and 12, 1.86½c to 1.91½c; Nos. 13 and 14, 1.91½c to 1.96½c; Nos. 15 and 16, 2.01½c to 2.06½c. On box annealed, one pass, cold rolled, we quote Nos. 18 and 20, 2.21½c to 2.26½c; Nos. 22 and 24, 2.26½c to 2.31½c; Nos. 25 and 26, 2.31½c to 2.36½c; No. 27, 2.36½c to 2.41½c; No. 28, 2.46½c to 2.51½c; No. 29, 2.56½c to 2.61½c; No. 30, 2.66½c to 2.71½c. Jobbers' prices have also been advanced proportionately with the advance on mill shipments. We quote on lots from warehouse stocks as follows: No. 10, 2c to 2.05c; No. 12, 2.05c to 2.10c; No. 14, 2.10c to 2.15c; No. 16, 2.20c to 2.25c; No. 18, 2.40c to 2.45c; No 20, 2.45c to 2.50c; No. 22, 2.50c to 2.55c; No. 24, 2.55c to 2.60c; No. 26, 2.60c to 2.65c; No. 27, 2.70c to 2.75c; No. 28, 2.80c to 2.85c; No. 29, 2.90c to 2.95c. Galvanized sheets, mill shipments, Chicago delivery, are quoted without change as follows: Nos 12-14, 2.46½c; No. 16, 2.61½c; Nos. 18-21, 2.76½c; Nos. 22-24, 2.91½c; No. 26, 3.11½c; No. 27, 3.31½c; No. 28, 3.51½c. Jobbers' prices have been advanced $2 a ton, and we revise our store prices as follows: Nos. 10 to 16 inclusive, 2.80c to 2.90c; Nos. 18 and 20, 2.90c to 3c; Nos. 22 and 24, 3.10c to 3.20c; No. 26, 3.30c to 3.40c; No. 27, 3.50c to 3.60c; No. 28, 3.70c to 3.80c; No. 29, 4.15c to 4.25c; No. 30, 4.60c to 4.70c.

Structural Steel.—The week has been quiet in specifications, due to the fact that many consumers while enjoying the holidays have also been taking inventory. Contracts for none of the building contracts which have been pending for so long have been let as yet, though figures on one or two of them are being taken. The outlook, however, is one of promise, the consumption of structural shapes in this market in the coming year bidding fair to exceed that of any year previous. We quote prices unchanged, on carload lots, mill shipments, Chicago delivery, as follows: Beams and channels, 3 to 15 in. inclusive, 1.66½c; angles, 3 to 6 in., ¼ in. and heavier, 1.66½c; angles, larger than 6 in. on one or both legs, 1.76½c; beams larger than 15 in., 1.76½c; zees, 3 in. and over, 1.66½c; tees, 3 in. and over, 1.76½c, with the usual extras for cutting to exact lengths, punching, coping, bending or other shop work. Store prices have been advanced, and, according to tonnage, are quoted: 1.95c to 2.10c for angles, beams and channels, base sizes, with 2.05c to 2.15c for 18, 20 and 24-in. beams; tees and zees, 2c to 2.10c. These prices are for either random lengths or cut to specifications.

Plates.—Mills report that specifications in the past week have not been as heavy as in the immediate past. There is a fair demand in the way of new business, a number of consumers fearing difficulty in getting shipments later in the year having placed supplementary orders for immediate delivery, paying a premium of $1 a ton above association prices for same. We quote carload lots, mill shipments, Chicago delivery, as follows: Tank steel, ¼ in. and heavier, 6¼ in. to 14 in. wide, rectangular plates only, 1.56½c base; over 14 in. to 100 in., 1.66½c base; flange steel, 1.76½c base; marine steel, 1.86½c base, all full extras. Plates, 3-16 in. thick, $2 extra; gauges 7 to 8, $3 extra; No. 9, $5 extra. Less than carload lots, $5 extra. Store prices are very firm. We have revised our quotations as follows: Tank steel, ¼ in. and heavier, up to 100 in. wide, 1.90c to 2c; 3-16 in. up to 72 in., 2c to 2.10c; No. 8, up to 60 in. wide and No 10 up to 48 in. wide, 2c to 2.10c. Extras ranging from 10c to 25c are charged for wider widths; flange steel, 25c extra.

Rails and Track Supplies.—Since the reaffirmation of prices the local interest has booked orders for heavy rails aggregating 250,000 tons, more than one-half of which has been closed up in the past ten days. These include orders from the Chicago & Northwestern, Southern Indiana, Wisconsin Central, Lake Shore & Michigan Southern, Baltimore & Ohio, and the Cincinnati, Hamilton & Dayton. The demand for light rails and track supplies has been very heavy of late, notably the latter, all the Western mills having very large tonnages on their books for 1905 delivery. We quote heavy sections in 500-ton lots and over, f. o. b. mill, $28; less than 500 tons to carload lots, $30; less than carload lots, $32. Light rails are as follows: 12-lb. sections, $26; 16 lb., $25; 20 and 25 lb., $24; 30, 35, 40 and 45 lb. sections, $23, all f. o. b. Milwaukee mill. Track supplies f. o. b. Joliet mill: Angle bars, 1.30c to 1.35c; spikes, first quality, 1.70c to 1.75c; track bolts, 3¼ x ¾, with square nuts, 2.30c to 2.40c per 100 lbs., with hexagon nuts, 2.45c to 2.55c.

Merchant Steel.—New business is of small proportions, for the reason that leading manufacturers have withdrawn from the market. Specifications, however, are very large, consumers taking up their full contract quotas in every instance. Prices are without change, and we quote carload lots, mill shipments, Chicago delivery, as follows: Spring steel, 2c; sleigh shoe, flat sizes, 1.61½c; concave and convex, 1.76½c; cutter shoe, 2.25c; smooth finished machinery steel, 1.81½c; smooth finished tire, 1.76½c; plow steel, 2.20c and upwards, according to quality; toe calk steel, 2.11½c. Crucible tool steel, 6½c to 8c; special grades of tool steel, 13c and upwards. Cold rolled shafting, old prices of which were reaffirmed at the recent meeting, we continue to quote at 52 percent from list on carload lots, and 47 percent discount on less than carload lots.

Merchant Pipe.—A new schedule of discounts went into effect Jan. 2, the leading producer having advanced its price $1 a ton. Demand is of strong proportions, many consumers and jobbers stocking their warehouses to guard against a shortage in the coming spring and summer. We have revised our prices and quote carload lots, mill shipments, random lengths, f. o. b. Chicago as follows:

MERCHANT PIPE.

	Steel Pipe.		Guaranteed Wrought Iron Pipe.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛ and ¼ inches	66.85	50.85	64.85	48.85
⅜ and ½ inches	70.85	58.85	68.85	56.85
¾ to 6 inches	74.85	64.85	73.35	63.35
7 to 12 inches	69.85	54.85	68.35	52.85
Extra Strong Plain Ends.				
⅛ to ¾ inches	59.85	47.85	57.85	45.85
½ to 4 inches	66.85	54.85	64.85	52.85
4½ to 8 inches	62.85	50.85	60.85	48.85
XX Strong Plain Ends	55.85	44.85	53.85	42.85

Boiler Tubes.—Demand continues without appreciable cessation, and both mills and jobbers report the outlook in sanguine terms. We quote mill shipments, carload lots, Chicago deliveries, as follows:

BOILER TUBES.

	L. W. Steel Percent.	C. C. Iron. Percent.	Seamless Steel. Percent.
1 to 1½ inch	44.35	41.35	52.35
1¾ to 2¼ inch	56.35	41.35	40.35
2½ inch	58.35	46.35	43.35
2¾ inch to 5 inch	64.35	53.35	Up to 4 inches 50.35
6 to 12 inch	56.35	41.35	

The following are the agreed discounts from store:

	Steel.	Iron.	Seamless Steel.
1 to 1½ inches, inclusive	40½	37½	40
1¾ to 2¼ inches, inclusive	50½	35	37½
2½ inches, inclusive	53	37½	40
2¾ to 5 inches, inclusive	60½	47½	47½
6 inches and larger	50½	35	

Cast Iron Pipe.—The market continues quiet, due to the unseasonable weather. Prices are without change, and we quote carload lots, Chicago delivery, as follows: 4-in. water pipe, $28.50; 6 in. and larger, $27.50; gas pipe, $1 a ton higher.

Wire Products.—No diminution is to be noted in the demand for wire products which keeps up to the excellent proportions frequently referred to in the past in these columns. Prices are firm and without change. We quote carload lots, mill shipments, Chicago delivery, as follows: Wire nails, $1.90; painted barb wire, $2.05; galvanized barb wire, $2.35; smooth annealed wire, $1.75; smooth galvanized wire, $2.05; polished staples, $2; galvanized staples, $2.30. Less than carload lots to jobbers are 5 cents higher than above prices. The retail trade is quoted 5 cents extra over the foregoing on carload lots, and 10 cents extra on less than carload lots. Bale ties are unchanged at 82½ and 5 percent to 85 percent discount f. o. b. Waukegan, Ill., on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet and DeKalb, with actual freight allowed not exceeding 30 cents per 100 lbs.

Foundry Coke.—Since railroads removed the demurrage charges from coal and coke for one week after date of arrival there has been no lack of coke in this market for current needs. This abundant daily supply has prevented the market from attaining high values, and the anomaly is presented today of spot coke being sold at lower prices than for forward deliveries. Standard 72-hour Connellsville coke is quoted all the way from $2.75 to $3 at the ovens, or $5.40 to $5.65 Chicago, the lower price being for immediate shipment and the latter for contract deliveries. Wise Co. (Va.) fuel is quoted on the same basis as Connellsville and the same conditions govern its sale to a large extent.

Old Material.—Transactions in the past week have been of a limited nature and were concluded only where desirable lots were offered at a slight recession from prevailing prices. The market remains firm with but few changes in quotations. We have revised our prices and quote dealers' selling prices, gross tons, as follows:

Old steel rails (4 feet and over)	$16 00 to 16 50
Old steel rails (less than 4 feet)	15 00 to 15 50
Old iron rails	21 00 to 22 00
Relaying rails, subject to inspection	22 00 to 22 50
Relaying rails, without inspection	20 00 to 20 50
Old wheels	16 00 to 16 50
Heavy melting steel	13 50 to 14 00
Mixed country steel	8 75 to 10 25
Low phosphorus scrap (.05 and under)	14 00 to 14 50

The following quotations are for net tons:

No. 1 R. R. wrought	17 50 to 18 00
No. 2 R. R. wrought	16 50 to 17 00
Shafting	17 50 to 18 00
Dealers' Forge, No. 1	14 50 to 15 00
Wrought pipe and flues	13 00 to 13 50
No. 1 cast, 150 lb. and less	13 00 to 14 00
No. 1 mill	11 00 to 11 50
No. 1 Busheling	12 50 to 13 00
No. 2 Busheling	11 00 to 11 50
Country sheet	8 00 to 8 50
No. 1 boilers, cut	11 50 to 12 00
Boiler punchings	14 00 to 14 50
Iron car axles	21 50 to 22 50
Steel car axles	17 00 to 17 50
Iron axle turnings	12 00 to 12 50
Steel axle turnings	12 00 to 12 50
Cast borings	8 50 to 9 00
Mixed borings, etc	8 50 to 9 00
Machine shop turnings	11 50 to 12 00
Railroad malleable	13 50 to 14 00
Agricultural malleable	13 00 to 13 50
Stove plate and light cast scrap	12 50 to 13 00
Old iron splice bars	18 50 to 19 00

The coke furnace at Embreeville, Tenn., after having been remodeled and enlarged will be put in blast early this month. Its product will be foundry and malleable Bessemer pig iron. Pickands, Brown & Co., the Rookery, Chicago, are sales agents.

CLEVELAND.

OFFICE OF THE *Iron Trade Review*,
BROWNING BUILDING, Jan. 4.

Iron Ore.—The open market which prevailed during the past year did not prove disastrous. While it is true that prices at which most of the sales were made were lower than those proposed by the merchant ore members of the old association when an effort to continue the association was being made last spring (the difference on old range Bessemer being the largest, 55 cents), competition did not result in as low quotations as were feared by some dealers, and, on the whole, conditions were satisfactory. The dealers having seen that it is possible to carry on business without an association and still sell their ore at fair prices, are now disposed to co-operate. There will be no association this year; in fact, no attempt will be made to form one. Since the producing-consuming interests have become so important and since long time contracts have further complicated the situation, it is deemed hopeless to maintain an association in which all interests will be represented, but informal conferences of the merchant ore men have been held and there is general agreement that prices for 1905 shall be as follows:

Old range Bessemer	$3 75
Old range non-Bessemer	$3 20 to 3 25
Mesabi Bessemer	3 50
Mesabi non-Bessemer	3 00

All the masters of the steamers of the Pittsburg Steamship Co. have signed contracts for 1905 at the same wages that were paid last year. Appointments of masters have been made and they will hire the mates and have full charge of the deck crew. The mates will be required to sign contracts providing that if they join any labor organization they will forfeit their appointments. It is expected that all labor matters will be adjusted long before the opening of navigation.

Pig Iron.—Little business is being done except for immediate shipment and prices for spot iron are higher. Whether they will be maintained after buying for the second and third quarters is resumed is uncertain. Many furnace men feel the present prices are high enough and will be content if they do not go higher. They deplore any tendency to boom prices. For No. 2 foundry $16.50 Valley is bottom price and $17 is occasionally paid. Local furnaces have no iron for sale for prompt shipment and No. 2 foundry has been shipped from New York state to Cleveland and sold at $17.40 delivered. Southern is held at $13.50 to $14 for No. 2, Birmingham. We quote as follows, Cleveland delivery:

Bessemer	$16 95 to 17 10
No. 1 Foundry	17 50 to 18 00
No. 2 Foundry	17 00 to 17 50
No. 3 Foundry	16 25 to 16 50
No. 2 Southern	17 35 to 17 85
Gray Forge	16 00 to 16 50
Gray Forge, Southern	16 00 to 16 60
Lake Superior charcoal	18 00 to 18 50

Coke.—Furnaces are having much difficulty in getting coke delivered, owing to scarcity of cars. Prices for furnace coke have advanced and from $3 to $3.25 is now being asked for prompt shipment.

Finished Material.—Reports are almost uniformly favorable. Many sellers have been devoting their energies largely to getting specifications and have met with gratifying success. Owing to the very high price of old rails, re-rolling is not profitable and makers of new rails have little competition on short sections even at present prices, which are considerably higher than those which prevailed a few weeks ago. Steel bars sell slowly at the new price, 1.49½c Cleveland. Bar iron has advanced to 1.70c for ordinary business. Demand for sheets continues fair since the recent advances. While all who could do so contracted before the advances were announced, the principal producer gave few buyers an opportunity to cover. The prices of the principal producers through jobbers are as follows, Cleveland delivery, the freight from Pittsburg being 9½ cents: Mill sales of black sheets in carload lots, No. 10, 1.79½c; Nos. 11-12, 1.84½c; No. 14, 1.89½c; No. 16, 1.99½c; No. 27, 2.39¼c; No. 28, 2.49¼c. Galvanized, mill sales, No. 14, 2.54¼c; No. 16, 2.64½c; No. 18-20, 2.84¼c; No. 22-24, 2.94½c; No. 25, 3.14½c; No. 27, 3.34½c; No. 28, 2.54¼c. Out of stock, black sheets, ¼ in., 1.80c; 3-16 in., 1.90c. Blue annealed, No. 10, 2.05c; No. 12, 2.10c; No. 14, 2.15c; No. 16, 2.25c. One pass cold rolled: No. 18-20, 2.45c; No. 22-24, 2.50c; No. 26, 2.55c; No. 27, 2.60c; No. 28, 2.70c; No. 30, 3.10c. Galvanized out of stock, No. 16, 2.85c; No. 18-20, 2.95c; No. 22-24, 3.10c; No. 26, 3.30c; No. 27, 3.50c; No. 28, 3.70c; No. 30, 4.50c.

Old Material.—Business is better than for the preceding two weeks and prices of old rails, car wheels, boiler plate axles, heavy steel, turnings and drillings are higher. We quote as follows, gross tons, Cleveland:

Old iron rails	$23 00 to 23 50
Old steel rails (over 6 feet)	16 50 to 17 00
Old steel rails (under 6 feet)	17 00 to 17 50
Old car wheels	17 50 to 18 00
Steel boiler plate	11 00 to 12 00
Steel axles	18 00 to 19 00
Malleable iron (railroad)	15 00 to 15 50
Malleable iron (agricultural)	14 50 to 15 00
Heavy steel	16 50 to 17 00

We quote as follows, net tons:

No. 1 R. R. wrought	17 00 to 17 50
No. 1 busheling	14 50 to 15 00
No. 1 machine cast	14 50 to 15 00
Iron axles	20 00 to 21 00
Axle turnings	12 50 to 13 00
Wrought turnings (free from cast)	12 00 to 12 50
Grate bars	10 00 to 10 50
Pipes and flues	13 00 to 14 00
Tank iron	10 00 to 10 50
Hoop and band iron	8 00 to 9 00
Sheet iron	6 50 to 7 50
Wrought drillings	12 00 to 12 50
Stove plate	11 00 to 11 50
Cast borings	8 00 to 8 50

CINCINNATI.

Jan. 3.

Coke.—On account of the holidays, labor conditions have been anything but satisfactory. This has very materially restricted the output, which taken in connection with the general shortage of cars has made it exceedingly difficult for dealers to secure sufficient tonnage to cover their orders. Prices are stiff, the best grades of foundry bring from $2.75 to $2.90 f. o. b. ovens.

Pig Iron.—The holiday period has had its effect on the pig iron market. Inquiries have dwindled materially and no special change is anticipated until next week. There have been a few sales during the week but with one or two exceptions these have been for no considerable tonnage. Most of the business transacted has been in lots from a carload to 100 or 200 tons, and this to fill immediate requirements. The lower grades are said to be very scarce and difficult to obtain, yet there are no inquiries of special moment. Consumers as a whole are thought to be fairly well supplied for the present, and this condition has been in a great measure the reason why furnaces that a week or two previously refused to take contracts for later than the first quarter are now said to be not unwilling to sell for the first six months. While there may be a few instances where Southern No. 2 has sold for $13 Birmingham basis, the consensus of opinion is that $13.50 is firmly established, and is the maximum as well as minimum for this product. Northern Iron has gained slightly and is firm at $16 to $16.50 furnace. We learn of one sale of 1,000 tons of malleable to a Central Ohio consumer, and another for the same territory consisting of 1,000 tons of Northern and 500 tons of Southern No. 2 foundry. Quotations f. o. b. Cincinnati as follows:

Southern Foundry No. 1	$ 16 75
Southern Foundry No. 2	16 50
Southern Foundry No. 3	15 75
Southern Foundry No. 4	15 50
Southern Foundry No. 1, soft	16 75
Southern Foundry No. 2, soft	16 50
Gray Forge	15 25
Northern Foundry No. 1	17 65 to 18 15
Northern Foundry No. 2	17 15 to 17 65
Northern Foundry No. 3	16 65 to 17 15
Southern Charcoal	18 75 to 19 00

Finished Material.—The market is strong with the outlook in all lines full of promise. Numerous contracts have been made during the past ten days and a condition above normal prevails. Bar iron is quoted at 1.65c; steel bars at 1.53c, half extras, with dealers quoting 1.85c for iron and steel out of store. Galvanized sheets at 75 and 10 and 5 percent off. We quote black sheets, No. 27, at 2.40c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.70c; No. 27, 2.60c; No. 16, 2.20c; No. 14, 2.10c; No. 12, 2.05c; No. 10, 2c. Tank plates are firm and sell out of stores at 1.95c for ¼-in. and 2.05c for 3-16 No. 8 and No. 10. Beams and channels are quoted at 1.95c from stock, and angles at 1.95c to 2c for base sizes.

Trade on merchant pipe is fairly active, with prices unchanged. Carload lots are quoted as follows f. o. b. Cincinnati:

MERCHANT PIPE.
(Basing Discounts.)

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛ and ¼ inches	67.35	51.35	65.35	49.35
⅜ and ½ inches	71.35	59.35	69.35	57.35
¾ to 6 inches	75.35	65.35	78.85	63.85
7 to 12 inches	70.35	55.35	68.85	53.35

Old Material.—Dealers say that they do not anticipate any great amount of trade until the next week. There has been no interruption to the general trend of things along this line, but the indications are that an exceedingly active year is before dealers in this class of material. Quotations are as follows:

Old No. 1 railroad wrought, net tons	$15 00 to 15 50
Cast machine and foundry, net tons	13 50 to 14 00
Old iron rails, gross tons	19 00 to 20 00
Old steel rails, gross tons	14 00 to 15 00
Old short lengths, gross tons	14 50 to 15 00
Old iron axles, net tons	19 00 to 20 00
Stove plate, net tons	9 50 to 10 00
Wrought turnings, net tons	10 00 to 10 50
Cast borings, net tons	9 00 to 9 50

NEW YORK.

OFFICE OF THE *Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., Jan. 3.

Pig Iron.—Despite the holidays, the local pig iron market was prety active during the past week. Some good round lots of iron were contracted for, divided between foundry and basic, with the former perhaps leading. Prices are now firmer than they have been for a year past, and there were some furnaces, both Northern and Southern, which during the past week gave quotations that were from 25 to 50 cents over those they named the week previous. The increased firmness in prices has been most notable in Southern brands, while actual sales for No. 2 foundry have been made at $13.50 Birmingham, and while there is little reason to doubt that good quantities can still be purchased at this price, we know of a small company which named $14 on an inquiry for 1,000 tons. Northern No. 2 foundry remains at $16.75 at Eastern

Pennsylvania furnaces. Sales agents here, representing many furnaces, say their total orders for December comprised a larger tonnage than for any month of the old year. Nothing tangible has developed as to the course of the market for the new year. There are many inquiries out, but the most of them, according to advices, relate to buying for the third and last quarters of the new year. The willingness of buyers to contract for this delivery at prices in vogue for weeks past is only equaled by the reluctance of furnaces to talk business with them for those periods. There are no new developments in foreign irons. New York quotations at tidewater follow: Northern No. 1 foundry, $17.75 to $18; No. 2 foundry, $17.25 to $17.50; No. 2 plain, $16.75 to $17; Southern No. 1 foundry, $17.50 to $17.75; No. 2 foundry, $17 to $17.25; No. 3 foundry, $16.50 to $16.75; No. 4 foundry, $16 to $16.25.

Rails.—Gossip continues of past and prospective sales, that cannot be confirmed. It can be stated authoritatively, however, that the Vanderbilt contracts for 126,000 tons have been closed. Another contract reported closed is for 30,000 tons for the Northern Pacific road.

Finished Iron and Steel.—Very little new business in structural shapes found its way into the market during the past week. The leading interest has practically closed the Harriman contract for 14,000 tons, noted last week. Another contract taken by it is for 3,500 tons from the Indianapolis Southern, with small orders from other railroads aggregating about 500 tons. One of the large local department stores is expected to order about 10,000 tons for a new building which it will erect in the near future. From the West come announcements of cutting prices in fabricated material. Orders for plates, bars and sheets were fairly numerous during the past week, especially in the first two materials mentioned, and for which increased activity is expected in the next few weeks. New York prices at tidewater follow: Angles, 3 to 6 in. x ¼ in. and heavier, 1.64½c; beams, 3 to 15 in., 1.64½c; channels, 3 to 15 in., 1.64½c; beams, 18, 20 and 24 in., 1.74½c; tees, 3 x ¼ in. and heavier, 1.69¼c; plates, carloads, tank, 1.64½c; flange, 1.74½c; marine and ordinary fire box, 1.84½c; refined iron bars, 1.64½c; soft steel bars, 1.54½c to 1.60c; sheets, in carload lots, New York, No. 28, black, 2.50c to 2.55c; galvanized, 3.55c to 3.60c.

Old Material.—It was a waiting market in old material during the past week, transactions closed having been light. Holders seem to be further away than ever from meeting buyers' views, and it is not an unusual thing to hear asking prices vary from $1 to $2 per ton higher than well authenticated sales a short while previous. Approximate prices are f. o. b. cars as follows:

Old iron rails	$17 00 to 18 00
Old steel rails, long lengths	15 50 to 16 00
Old steel rails, short pieces	15 00 to 15 50
Relaying rails	20 00 to 21 00
Old car wheels	15 00 to 15 50
Old iron car axles	20 00 to 21 00
Old steel car axles	17 00 to 18 00
Heavy melting steel scrap	15 50 to 16 50
No. 1 railroad wrought scrap	17 00 to 18 00
Iron track scrap	15 00 to 16 00
Wrought pipe	12 00 to 12 50
Ordinary light iron	11 00 to 12 00
Cast borings	8 00 to 9 25
Wrought turnings	11 00 to 12 00
No. 1 machinery cast	14 00 to 15 25
Stove plate	11 00 to 12 00

PHILADELPHIA.

Jan. 3.

The new year opens with very much brighter prospects than those of 1904. Manufacturers are well pleased with the outlook. While there is no disposition to force higher prices, advances are expected.

Pig Iron.—The demand is fully up to capacity of furnaces and all indications are that prices will be higher. Buyers are insisting upon prompt shipments. Coke is scarce and prices higher. Railroads are slow in delivering iron and coke.

Finished Material.—The market has been quiet during the holiday period, but prices are firm and new business is expected to develop rapidly this month. We quote as follows: Refined bar iron, $1.63½ to $1.65; steel bars, $1.53½ to $1.55 and to $1.53½ to $1.55 for plates ,angles, beams and channels.

Old Material.—Business is rather quiet, but prices are advancing and strong demand is expected. We quote: No. 1 steel scrap, $16 to $16.50; low phosphorus scrap, $20.50 to $21; old steel axles, $19 to $19.50; old iron axles, $23 to $23.50; old iron rails, $20 to $21; old car wheels, $15 to $15.50; choice R. R. No. 1, wrought, $19.50 to $20; machinery scrap, $15 to $15.50; wrought turnings, $12.75 to $13; cast borings, $10 to $10.25; stove plate, $13.50 to $14; wrought iron pipe, $15 to $15.50.

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review.*
ROOM 1315, No. 150 NASSAU ST., Jan. 3.

Pig Tin.—After ruling strong all the week, prices broke sharply today, with the publication of the monthly statistics of Secretary C. Mayer, of the local Metal Exchange, which showed several unfavorable features. The total vissibly supply to Dec. 31, 1901, was 14,768 tons as against 14,412 a month ago, while the arrivals for the month were 2,597 tons, against 2,204 tons a month prior. Stocks on hand at the close of the year were 1,211 tons, with 3,350 tons afloat. The London market declined about £2 today, both for spot and futures, after being firm all the week. Today's closings follow: Spot, 29.00 to 29.07½c; January, 28.87½c to 29.07½c; February, 28.80c to 29.00c. London's closings today follow: Spot, £132 2 s 6d; futures, £132 10s.

Copper.—Asking prices were advanced ⅛c during the week by the leading producers. The trade situation, however, shows little or no change from weeks past. London during the week was active, with prices on a higher level. The exports during December amounted to 19,533 tons, as against 22,077 tons for November. Closing prices today follow: Lake, 15.00c to 15.25c; electrolytic, 14.87½c to 15.00c; casting, 14.62½c to 14.87½c. London's closings today follow: Spot, £68 12s 6d; futures, £68 18s 9d.

Lead.—There is no change in spot, which is quoted at 4.60c to 4.70c. St. Louis remains at 4.52½c to 4.62½c, according to brand. London advanced to £12 18s 9d.

Spelter.—Is considerably firmer under an increased demand, spot being 6.10c to 6.15c. St. Louis advanced twenty points to 6.00c. London is also higher at £25 5s.

Antimony.—Prices are without change, Cookson's being 9.00c to 9.25c, Hallett's 8.75c to 9.00c, and other brands, 7.75c to 8.25c.

Quicksilver.—We quote $40 per flask of 75 lb. in lots of 100 flasks. London is £7 15s.

Nickel.—Sales are made at 40c to 47c for large lots down to a ton, and at 50c to 60c for small quantities.

CHICAGO.

OFFICE OF *The Iron Trade Review.*
1164 MONADNOCK BLOCK, Jan. 3.

There has been little activity in metals in the week under review, consumers generally taking advantage of the holiday season to conclude their inventory work. Prices remain practically without change. We quote as follows: Lake copper, in carloads, 15¼c; in less than carload lots, 15½c to 15¾c; casting copper, 15⅜c for carloads, and 15½c for smaller lots; pig tin, carloads, 30¼c; lesser quantities, 30¾c. Sheet zinc, 6.75c for carload lots of 600-lb. casks, and 7¼c to 7⅝c for less than carload lots. Pig lead, 4.60c for 50-ton lots, 4.75c for carload lots, and 4.90c to 4.95c for smaller quantities. Spelter 5¾c for carload lots, and 6c for lesser amounts.

Dealers' prices on old metals are as follows: Copper wire and heavy, 12¾c; copper bottoms, 11½c; copper clips, 12¼c; red brass, 11½c; red brass borings, 9¾c; yellow brass, heavy, 8½c; yellow brass borings, 7½c; light brass, 6¾c; tea lead, 4c; zinc, 4c.

Lake Superior Iron Mines.

The outlook for mining operations on the Menominee range is very favorable. Mining will be resumed at the Walpole mine with a large force. The Pewabic Co. will add 200 men to its working force as soon as possible. The Mineral Mining Co. will resume operations at the long idle mine at Waucedah, furnishing employment to 50 men. The Oliver Iron Mining Co. will add 250 men to the working force at the Chapin mine as soon as they can be secured. The Aragon mine at Norway will employ 100 men. The Riverton and Dober mines in the Iron river district and the Mansfield in the Crystal Falls district will be worked steadily during the year furnishing employment to about 400 men. Corrigan, McKinney & Co. will employ between 300 and 500 additional men at their mines. The Vivian Co. will employ several hundred more men. The Loretto mine will be operated steadily during the year and men are wanted. The Antoine Ore Co. is preparing for a large output and will employ more men. The same is true at the Munro mine. At the Millie mine resumption of operations is under consideration.

The H. C. Frick Coke Co., the coke producing company of the United States Steel Corporation has added to its coking properties by the purchase of the Crossland Works of the Atlas Coke Co. This plant contains 100 ovens and is located in the upper Connellsville region. This plant has been idle for some time but is to be fired immediately. Negotiations are also about to be closed by the Frick Co. for the purchase of nearly 1,000 acres of coking coal land in the upper Connellsville region located in Georges, North and South Union Townships. The price that will be paid for this property has not yet been learned but according to reports will be close to $2,000 an acre.

The Cleveland Electric Co. has ordered 50 convertible type cars of the J. G. Brill Car Mfg. Co. The Chesapeake & Ohio has increased its order with the Pressed Steel Car Co. to 1,000 steel cars. The Mobile & Ohio expects to assemble material at its own shops in the near future for 200 miscellaneous cars. The Chicago & Eastern Illinois is about to order 500 box cars, and is reported in the market for additional gondola cars. The New York, Chicago & St. Louis has ordered 500 box cars. It is understood that the order was placed with the Haskell & Barker Car Co. The Harriman Lines have ordered 106 cars for passenger service of the St. Louis Car Co. It is understood that this includes cars for the San Pedro, Los Angeles & Salt Lake.

The recent purchase of pig iron in England by R. D. Wood & Co., of Philadelphia, is not significant of a beginning of importations by reason of the advance in domestic prices. It indicates, however, that but for the tariff pig iron would now be pouring into Atlantic ports. The Philadelphia company, with a large foreign order on its books, doubtless found the purchase of English pig iron advantageous, in view of the drawback it would secure on the importation of the finished product.

The Sheffield Co., Sheffield, Ala., advises us that there is no truth in the report published by Southern newspapers that it had purchased or expected to purchase the Lady Emsley furnace is entirely without foundation. The company is not in the iron business.

RETIREMENT OF L. C. HANNA.

Leonard C. Hanna, senior member of the firm of M. A. Hanna & Co., retired on Jan. 1 after 30 years' connection with the firm. Mr. Hanna was born in New Lisbon, Columbiana county, O., and came to Cleveland with his parents when a child. When a very young man, he decided to go into business, and his brother, M. A. Hanna, was anxious to have him associate himself with the coal firm of Rhodes & Co., then composed of R. R. and J. F. Rhodes and M. A. Hanna, and already well established and prosperous. But the younger brother was of an independent disposition and desired to establish a business of his own. He accordingly went to St. Paul, Minn., with but little capital except his energy and ability, and engaged in the coal business in the years '72, '73 and '74. These years included the great panic of '73, during which nearly all the business concerns of St. Paul were financially embarrassed. Mr. Hanna and his business associate, E. M. Saunders, managed, however, to weather the storms and were very successful. Mr. Saunders is still a resident of St. Paul and one of its most prominent business men, being president of the Northwestern Fuel Co. and connected with other enterprises. James J. Hill, who was then operating the St. Paul & Pacific R. R., which later became the foundation of his great railroad system, was one of Mr. Hanna's most active competitors in the coal trade. Mr. Hanna regards the three years spent in St. Paul as of inestimable value to him, as he believes that he then acquired more business experience than he would have in many years in a large firm.

At the close of 1874 he decided to return to Cleveland, and on Jan. 1, 1875, became connected with the firm to which he was to give 30 years' service. He was admitted as a partner in 1879 and was soon recognized as one of its strongest members. When, some ten years ago, his brother, M. A., became actively interested in politics and was able to give little attention to the firm, Mr. Hanna became its active head, and during the decade just passed the volume of business has increased rapidly and the firm has had great prominence in the iron and steel world. Mr. Hanna has long been considered one of the leaders in the iron ore business of the country and in an important way was identified for years with lake vessel interests. When the Bessemer Ore Association was organized he was elected its president and continued in that position for nine years, until succeeded two years ago by Mr. Wm. G. Mather. Throughout this period, members of the association depended upon the judgment of no one more than upon Mr. Hanna's. Matters of dispute were frequently referred to him with the utmost confidence that his decision would be just. While Mr. Hanna no longer retains his own financial interest in the firm, he is one of the executors of the estate of the late Senator Hanna and will in that capacity be still connected with the business. In recent years he has been active in the directorate of the Republic Iron & Steel Co. and of the Cambria Steel Co.

The Bryant Steel Wheel & Rim Co., Columbus, O., has been incorporated with a capital of $100,000. Incorporators are: Richard S. Bryant, William A. Marsh, Henry F. Kruger, Campbell M. Chittenden and Herbert L. Thomas.

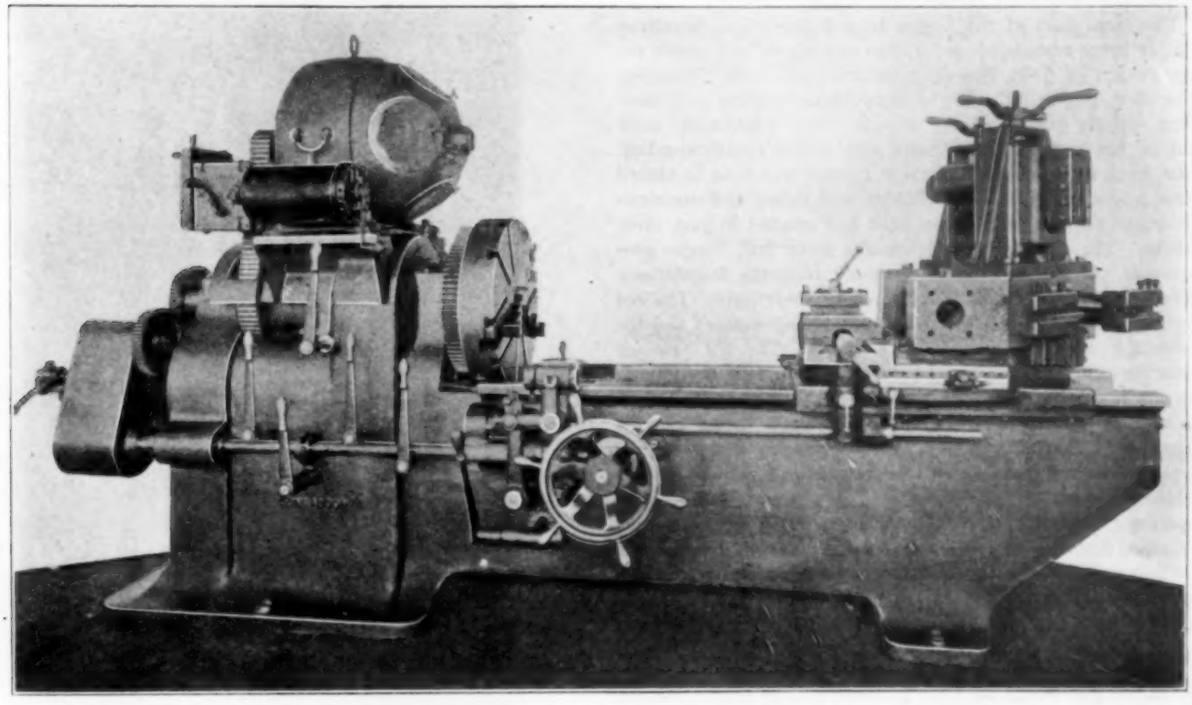
Fire at the Emma blast furnace plant of the American Steel & Wire Co., Cleveland, Jan. 4, so damaged the ore and coke stock house and the ship hoist that it was necessary to blow out the furnace.

The Marine Boiler Works Co., Toledo, O., has increased its capital from $100,000 to $125,000, and has changed from a New York to an Ohio corporation. The new capital will be applied to the enlargement of the business. Some new machinery will be installed.

HEAVY TURRET LATHE.

A lathe capable of doing at one setting the operations that would require eight or more settings of an ordinary engine lathe, is the 24-in. semi-automatic turret lathe manufactured by the American Turret Lathe Co., of Warren, Pa. Being intended for heavier work than is usually imposed upon a turret lathe, it has a massive bed construction, a large turret and is designed to swing 27 in. for a distance of 12 in. from the chuck.

Twelve rates of feed and feed reverse and eight speeds of the spindle are possible with each speed of the motor. The gear combinations for all these are protected and may be operated to effect a change in speed while the machine is running. The levers for the various gear clutches are shown under the head. The turret has universal facing heads and provides for 13 tools, though seldom more than five are used at a time. An auxiliary turret which will accommodate four tools and has power cross feed on one side of the turret. The latter has rapid power trasverse in either direction by a separate motor, and a slower travel through the feeding mechanism driven from the spindle. Rotating, indexing and clamping of the turret head are all automatic and an independent "knockout" or feed stop serves each face.



HEAVY TURRET LATHE WITH CROCKER-WHEELER MOTOR.

The spindle is driven through a Renold silent chain by a 10-h. p. Crocker-Wheeler semi-enclosed motor mounted above the headstock. An M. 12 controller in the current supply allows the motor twelve speeds, ranging from 876 to 130 r. p. m. With combination of electrical and mechanical means the highest and lowest possible chuck speeds are 90 and 1⅓ r. p. m. respectively. For the operation of the turret a 3-h. p. Crocker-Wheeler fully enclosed motor is used. This runs continuously at a constant speed of 1,000 r. p. m. on a two-wire supply and drives a steep-pitch lead screw through bevel gearing. A longitudinal shifting of the driven shaft clutches one or the other of the two bevel gears, producing direct or reverse rotation, or in the central position releases both.

After being idle for four months, work has been resumed by the Rockhill Furnace Co., Rockhill, Huntingdon Co., Pa.

RAILWAY BUILDING IN 1904.

Statistics of railway building in the United States for 1904, as compiled by the *Railway Age*, shows a falling off of about 25 percent compared with 1903, when 5,786 miles of new road were completed. Official returns for the current year, not yet complete, show that 4,168 miles of first track have been laid since Jan. 1 last on 299 lines in 43 states and territories. That there would be a decrease in new mileage this year was a foregone conclusion on account of the general business situation.

There is a large amount of new work projected, much of which is still awaiting financing. The revival of business, however, since the presidential election has given an impetus to railway building which promises greater activity in 1905. While the day of parallel railroad building is practically over, there are many extensions and feeders projected which are needed to develop new territory, and much important work designed to shorten main lines and reduce grades and curves is planned. One of the large Western systems has comprehensive plans of this nature, and if this work is undertaken during the coming year it will mean much to contractors and dealers in material.

In track laying in 1904, Missouri leads with 372 miles of new line, and Texas is second with 312 miles. Six other states show over 200 miles each as follows: Minnesota, 271 miles; West Virginia, 237 miles; Mississippi, 229 miles; Pennsylvania, 220 miles; Nevada, 215 miles, and California, 201 miles; while Illinois is near the 200-mile mark with 196½ miles. With the exception of the 60-mile link (of which 10 miles were completed) to connect the Western Maryland and the West Virginia Central & Pittsburg, and the completion of the Pittsburg, Carnegie & Western into Pittsburg, no work has been done during the past year on the various roads necessary to complete the Atlantic seaboard line of the Wabash system, and there are no indications that work is to be resumed soon on these lines. There are persistent rumors of an understanding between the Pennsylvania Railroad and the Gould interests which will make the construction of these lines unnecessary, and the fact that the work is still being held up lends color to them.

The following table, compiled by the *Railway Age*, shows the track laid by years since 1886:

Year.	Miles.	Year.	Miles.
1887	12,983	1896	1,848
1888	7,106	1897	1,880
1889	5,230	1898	3,083
1890	5,670	1899	4,588
1891	4,281	1900	4,437
1892	4,192	1901	5,222
1893	2,635	1902	5,684
1894	1,949	1903	5,786
1895	1,803	1904	4,168

According to the last edition of Poor's Manual, the railway mileage of the United States at the close of 1903 was 207,784 miles. The addition of the track laid during the past year makes the total main line mileage of the country in round numbers 212,000 miles.

The statistics of the *Railroad Gazette* show 3,832 miles of new track laid in 1904.

Logan Iron & Steel Co. Improvements.

The iron plant of the Logan Iron & Steel Co., Burnham, Pa., is being remodeled and almost entirely rebuilt under the supervision of John Fraser, contracting engineer, Pittsburg. The 18-in. puddle mill and the 18 and 8-in. finishing mills have been entirely remodeled and rebuilt. New foundations were put in, hot beds built and electrically driven shears installed. The work of reconstructing the 8-in. mill was done in record time, a new engine, new foundations, new tunnel and electrically driven shears having been built and erected in just three weeks. The work of remodeling the 12-in. mill is now progressing. It will be practically rebuilt from the foundations. New hot beds are being added, tunnels, shears, etc. The hot bed on one side will be used for rounds and squares and the other for angles, flats and other shapes. The hot saw for shearing will be underground so that there will be nothing on the hot beds to impede the progress of the material. A new track system was also installed, tracks being narrow gauge and the rails being 45-lb. sections. Some of the present heating furnaces will be rebuilt and possibly others added. Electric power is now used throughout the plant for operating the machinery. The main building has also been enlarged by the erection of a lean-to. When the work is entirely completed this will be one of the most modern of iron rolling mills east of the Alleghenies, with a daily output of about 70 tons.

The McClintic-Marshall Construction Co., with works at Pittsburg and Pottstown, Pa., received several large contracts recently for railroad construction. The Delaware, Lackawanna & Western Railroad contracted for a number of bridges for which about 5,000 tons of material will be required. For the N. Y. C. & H. R. R. telegraph poles, with a total tonnage of 1,500 tons, will be erected. Another large contract was closed with the Pennsylvania railroad for elevating tracks in Chicago requiring 1,500 tons.

Semi-official announcement has been made that as fast as wooden cars can be replaced by steel ones the wooden cars in the New York subway will be retired and eventually none but steel cars will be in use. Preparations for this change are being made as rapidly as the officials of the subway can do so. They have found that the steel cars in use now are not only much more convenient for the traveling public than the wooden ones, but are, of course, much safer in case of fire. At present only about 20 percent of the cars used in the subway are of steel.

The Bessemer plant and rail mill of the Lackawanna Steel Co., Buffalo, N. Y., which has been shut down for three weeks, resumed last week, with 800 men at work.

SUCCESSFUL WORK ON INTRICATE CASTINGS.

An ingenious foundryman, Dan Galvin, of Paducah, Ky., has produced some noteworthy castings from a skilful handling of just plain everyday sand, wood and hot metal. The maker has had sundry specimens on exhibition at St. Louis and was deservedly awarded a bronze medal. One of the castings which is representative of his ability is here illustrated. It may be mentioned that Mr. Galvin makes the patterns in his leisure following the regular daily work in the foundry where his stint is by no means small and fragile castings. When he made the sketches here shown he states he was engaged during the day on the production of a 4,000-lb. Corliss engine cylinder and had in this latter instance the patternmaking assistance of a house carpenter.

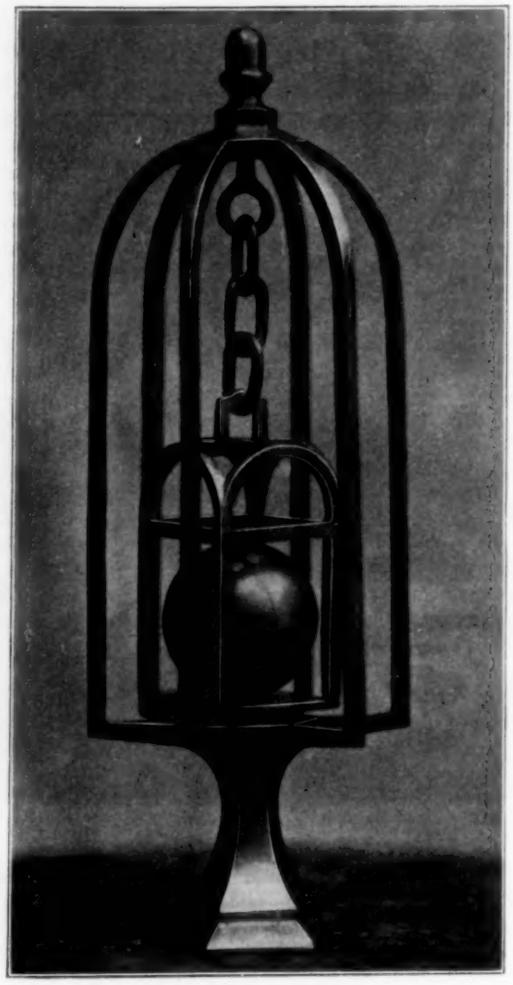


FIG. 1—THE CASTING.

The height of the loosely jointed casting here illustrated is 12 in. from the base to the tip of the acorn-shaped ornament at the top. The combination is 4 in. wide. The hollow ball is 1⅞-in. diameter and the enclosing cage has an exterior measurement of 1¾-in. The three sketches, Figs. 2, 3 and 4, show the arrangement of the different parts of the pattern and the core box, in the assembled as well as dissected order. There are not many parts and Mr. Galvin made in one day—molding and pouring—the three castings on exhibition in the Department of Mines and Metallurgy and has made several in cast iron as well as brass. The photograph was taken from one cast from brass.

The reference letters are the same in each engraving for the

designation of identical parts. The match board is seen at A and B is the core box showing the arrangement of the patterns in place. C is the end of the core box and D is the gate made in the core for hollowing out the base. E is the bottom plate of the pendant supporting the ball. F shows a section around the ball and G is the outside arch. H is employed for making the circle at top of the pendant and J is the link pattern.

The ball is hollow and is poured through the base. It is obvious how the metal flows to the several parts through the neatly contrived gates. There are three loose links in the chain and two of these are poured with a horn gate. The square holes shown in the core box and match are for the purpose of withdrawing some of the pattern pieces. When the gates are finally cut away from the casting and their location becomes somewhat difficult, owing to the finishing of the metal surface, it is easy to see that the device becomes considerable of a molding puzzle, and in this respect Mr. Galvin

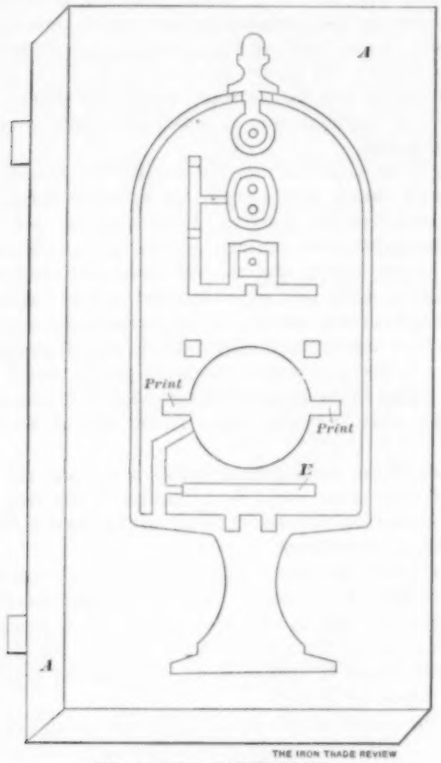


FIG. 2—THE MATCH BOARD.

has designed an intricate pattern capable of quite satisfactory results.

President Coulby, of the Steamship Co., has decided to name the four big steamers building for that company by the American Shipbuilding Co. for officials of the United States Steel Corporation. Two of the steamers will be turned out at South Chicago and will be christened Elbert H. Gary and William E. Corey. The steamer building at West Superior will be the George W. Perkins and the steamer building at Bay City will be named for Henry C. Frick. The boats, which will cost $1,720,000, will be the largest carriers on the lakes, being nine feet longer than the steamer Augustus B. Wolvin. The four steamers will, in a full season, carry 800,000 tons of ore.

The old mill operated by the Ohio Iron Co., Zanesville, O., recently sold at receiver's sale, is being dismantled and the material shipped to a Pittsburg scrap dealer. It was built in 1848 for a firm composed of Pittsburg iron and nail manufacturers. It was run regularly for a year or two and then shut down. After a lapse of a number of years it passed into the control of the Ohio Iron Co. and about five years ago the plant was acquired by the

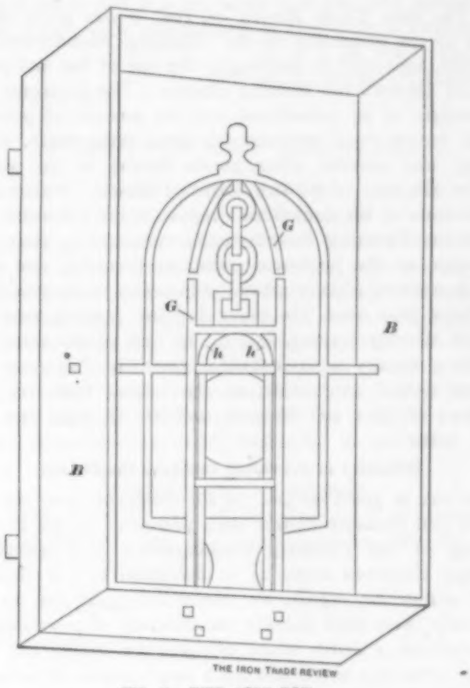


FIG. 3—THE CORE BOX.

Weatherall Co., organized by Indiana people. The mill ran for a time under boom conditions and when depression came was shut down.

The Detroit Seamless Steel Tube Co., Detroit, Mich., has

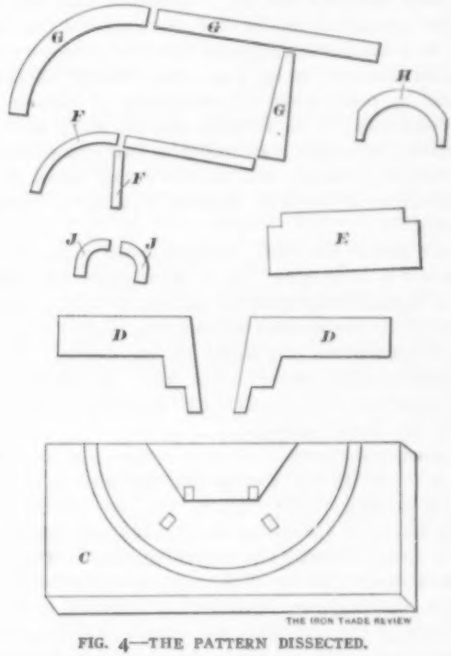


FIG. 4—THE PATTERN DISSECTED.

received a large offer for tubes from the government, to be sent to the Charleston navy yard.

The application of the Thomas D. West Foundry Co., Sharpsville, Pa., for a Pennsylvania charter was simply to change from an Ohio to a Pennsylvania corporation.

Fans and Pressure Blowers for the Foundry.

In *The Iron Trade Review* of Dec. 8 was given the full report of the committee of the Pittsburg Foundrymen's Association, appointed to investigate the use of fan and positive pressure blowers for foundry cupolas. The particular question sought to be determined was the amount of power required for fan and pressure blowers, respectively, but the inquiry also covered other points having to do with tne relative efficiency of the two forms of blower. Following the presentation of the committee's report at the December meeting of the Pittsburg Foundrymen's Association, there was a discussion of the important questions involved, and with a view to eliciting a more general expression of opinion further discussion was made the order for the January meeting to be held Monday evening, Jan. 9. In view of the value of the Pittsburg inquiry to foundrymen generally *The Iron Trade Review* invited expressions on the subject from the manufacturers of fans and blowers, and has in reply the letters given below:

Difficulty of Providing Identical Conditions.

You ask in yours of Dec. 10 for comment upon the report of fan and pressure blower tests presented at the December meeting of the Pittsburg Foundrymen's Association. Restricting ourselves solely to a discussion of the statements made within the report, we would first point out how emphatically these tests indicate the difficulty of providing identical conditions under which comparative results can be secured. Neither a single test nor a single cupola is sufficient to establish relative efficiencies of blast producing mechanism. The slight change in the size of the pieces of scrap charged produced such a marked difference between the results secured in the first and in the second series of tests, that one may properly question how near alike the conditions were in the two individual tests constituting either series. A single piece of scrap might, in any one of the four individual tests have been of such excessive size as to introduce abnormal resistance to the passage of the air and gases upward through the charges. It is therefore manifestly true that conclusive results can only be obtained by carrying tests through an extended period and by considering the efficiencies of blowers under varying conditions. It is probable that the scrap used in the second series conformed most nearly to that commonly found in the average foundry, and therefore this series is more fairly indicative of average working conditions throughout the country.

It is well said in the report that the actual saving in horsepower is not a large item. It is unfortunate that foundrymen often thoughtlessly consider the annual cost of power to be measured by the number of working days multiplied by the actual horsepower consumed by the blower; but as a blower operates only two or three hours per day, the total expense would be only one-quarter to one-third of the amount figured in this faulty manner.

Slight exception should be taken to article 3 of the addenda, where it is stated that "as the opening decreases in the cupola, due to the closing of the tuyeres, etc., the positive blower will force the same amount of air through this opening as it previously forced through the larger opening." This is true up to the limit of capacity of the blower, but under any conditions the relative power consumed is inversely proportional to the square of the area when the volume is maintained constant. In other words, if the area is reduced one-half, the velocity will have to be doubled to pass the same volume of air, and the total power required will be quadrupled. No other comment is necessary to show the absolute necessity of the freest possible areas for passage of air through tuyeres and charges. In fact, cupola blast practice consists principally in overcoming resistances, and it is undoubtedly true that in many cases the money expended in reducing scrap to smaller dimensions would be offset by the decreased cost of forcing blast through the more open charges thus provided.

The most interesting of all information to have secured in connection with these tests would have been the actual volume of air delivered to the cupola by both types of machine. This, however, is a practical impossibility without somewhat elaborate experimental equipment, and the report very properly states that the amount of horsepower consumed by the fan and blower are the only guides to the amount of air supplied.

The report as published lacks much desirable data regarding cupola, blower, fan and general arrangements.

B. F. Sturtevant Co.,

Hyde Park, Mass. By W. B. Snow.

Elasticity of the Centrifugal Fan.

The writer has been very much interested in Mr. H. E. Field's report on the comparative fan blower tests made at the instance of the Pittsburg Foundrymen's Association. The conclusion drawn can hardly be criticised by either party to this controversy, and the Pittsburg association deserve much credit for the thorough way in which they have carried out this investigation.

It was to be expected that the smaller fan blower would afford better results with a cupola 54-in. inside lining, which would hardly require 5,000 cu. ft. of free air per minute when melting its rated capacity, as was the case during this test. It would appear that the fan manufacturers erred in their desire to make sure of having the capacity ample. The No. 8 Sturtevant fan, which was the permanent provision for blast for the cupola, is the size which would naturally be selected. A few points have occurred to the writer which could be added to the conclusions embodied in the report, and give a still more favorable aspect to the case of the centrifugal fan.

1. Both of the experimental outfits were new, but in the course of years there would be a decrease in efficiency of the positive blower on account of wear in the contact surfaces, unless kept in adjustment.

2. The centrifugal fan is more elastic in its requirements, and when used from day to day on charges considerably lighter than the capacity of the cupola, it would handle them more economically than the positive blower, the discharge from which would be choked down, although the horsepower required would be greater.

3. If the cupola tender has a blast gate or cut-off in the pipe near at hand, the power expenditure of a centrifugal fan can be quite materially reduced by regulating the blast pressure according to the condition of the cupola. This is impossible in the case of a positive blower.

To illustrate the extreme elasticity of the centrifugal fan, if we take the horsepower required when running at normal capacity as 100 percent, exact tests show that when running at only half the full capacity, the horsepower required will be 60 to 65 percent and with blast gates closed off entirely, 28 to 30 percent. The fact that with piping on the outlet disconnected the fan will take almost exactly double the normal horsepower, shows the importance of having properly designed piping and a fan neither too small nor too large for the cupola.

It is interesting to note that a second test with the positive blower running at a lower speed than recommended by the makers gave a rate of melting nearly as high and with less power. Possibly a similar change in the speed of the centrifugal fan would have shown the same result. The experiment would be interesting. According to Mr. W. H. Carrier, of the Buffalo Forge Co.'s experimental department, an increase in pressure of 50 percent from 10 oz. to 15 oz. pressure gave an increased melting capacity of 25 percent

from 6 to 7½, the test being made on a 44-in. cupola. At the same time, the horsepower increased from 16 to 29, or nearly 100 percent. As a result of a series of tests, of which this was one, Mr. Carrier derived a formula for the horsepower required by a centrifugal fan, as follows:

H. P. equals $D^2 \times$ square root of $P^3 \div 3{,}800$.
D equals diameter of cupola inside lining.
P equals pressure at cupola in oz. per sq. in.

Based also on these tests and on this formula, a table was prepared, according to which a cupola 55-in. inside lining, supplied with blast at 12 oz. pressure by a centrifugal fan should melt 20,960 lb. per hr. with the ordinary melting ratio, and should require not over 32.7 h. p. for the blast.

The above data are taken from a paper read before the last convention of the National Foundrymen's Association, held in Indianapolis, and it is interesting to see how closely the Pittsburg Foundrymen's Association tests agree.

BUFFALO FORGE CO.,
Buffalo, N. Y. By C. A. Booth.

More Air Furnished by Pressure Blower.

I wish to thank you for the opportunity and make use of it by calling attention to a few points in connection with the test, without disparaging it in any way. I am in thorough accord with the efforts made and appreciate the facilities furnished and courtesy extended by the parties conducting the test.

An examination of the test records shows that the amount of air furnished by the blower was largely in excess of that furnished by the fan, or the pressures would have been more nearly alike, as the average free opening would be approximately the same. This means a waste of effort on the part of the motor to supply the excess pressure. It would be cheaper to set a relief valve at 16 or 18 ounces and allow the excess air to escape, rather than burn out the lining or chill the iron.

The test shows that a rotary blower may be used to force a heat in short time, if necessary, but it does not seem to me that the pressures used were those of normal foundry practice. Of course, a variable speed motor would be more economical than allowing the excess air to escape, but even a relief valve would have saved, roughly, 20 percent of the power on the blower test. It is fair to assume that equal pressures at the cupola are due to equal amounts of air passing through it, and a comparison of power used speaks rather plainly in favor of the blower. The positive blower is absolutely flexible in regard to speed up to its limit and its efficiency changes but slightly for the variations of speed needed in melting. The data of tests show this clearly.

Where a variable speed motor cannot be obtained, a relief valve would save power. Where the source of power is approximately as efficient as a simple engine, a direct connected engine and blower is the most flexible and efficient, for the engine speed may be regulated to suit the pressure, by either a hand cut-off adjustment or throttling.

A foundry using a fan is going to get every possible benefit inherent in the fan outfit; so with the positive blower, every point favorable to securing good results should be utilized.

I do not want to be understood as criticising the tests made, for all the conditions were fair and just; but what I do want to point out is that it is my belief that the good points of the rotary blower were not utilized to their best advantage.

P. H. & F. M. ROOTS CO.,
By Geo. C. Hicks, Jr., Engineer.
Connersville, Ind.

POINTS FOR SHOP AND OFFICE.

BY ROBERT GRIMSHAW.

The Technical Papers.

Every large manufacturing concern should subscribe liberally to the various technical papers which have bearing on its line, and should see that the heads of departments scan these carefully for hints which would be of use to the purchasing, selling, manufacturing or accounting departments. The current numbers should be carefully protected against dirt and wear by a neat temporary cover, bearing a printed form like the one here given; and they should be passed around in a definite predetermined order, beginning at the sales department.

Cooling Tools with Air Blast.

To keep down the cost of manufacture it is necessary to speed up the cut; and this can usually be done up to the heating point of the tool. To raise this limit, oil, soapsuds and water have been used from time beyond memory but it is not always possible to employ them. Another way to get speed is the use of the fast-cutting steels, which will bear a high heat without losing their temper. But this heat does not always do the work piece any good, as it expands and thus affects the dimensions, as once cool they are smaller than wished or intended. Of course the tool rest and the tail-center on lathe work can be run back as the work heats; but this calls for constant watchfulness on the part of the workman, and the piece may thereby be held too loosely. The real remedy seems to be, cooling both the tool and the work. As oil or water is not always permissible, there remains cooling with air as the only salvation. This may sound chimerical, but experiments with milling-machines, recorded by Brzoska, show a very marked increase in the cutting speed attained. The use of air has the advantage that it blows away the cuttings and keeps the cut free. Air cooling is not possible with cast iron work pieces, says Brzoska, on account of the iron dust raised (this the present writer challenges, as a suction apparatus can easily be added to the blast); but in working other metals the air cooling is highly satisfactory.

As the air which is directed on the cut can be made to cover considerable area, and as the amount delivered is practically unlimited, the cooling effect is quite measurable—so that the cramping of chucks and centers, etc., is avoided. The air current can be delivered by a small fan, driven like an ordinary (in Germany) lubricating-pump, either directly from the machine-tool, or from the countershaft; and can have a belt-shifter so as to be thrown out of service while the machine is running. One fan can also deliver the air for several machines. [A free translation from the German.

Pass along! *The Iron Trade Review*

The persons named below will give this periodical hasty but sharp attention and let the firm know of anything important therein contained. The last on the list will return the paper to library.

Mr.	Dept.	Number in the 7th volume 1 2 3 4 5 6 7 8 9 10 11 12 13
Hastings	Sales	
Ewell	Machine Shop	
Robson	Pattern Shop	
Wade Jr.	Foundry	

THE IRON TRADE REVIEW

THE USE OF PERIODICALS BY THE SHOP PERSONNEL.

DIAMOND TOOLS.*

BY G. C. HENNING.

Steel is, of course, the one material in almost universal use for cutting and working stone, metal, wood and other materials, because of its great strength and the degree to which it can be hardened. There are some materials, however, which, because of their hardness, structure or non-conductivity of heat, cannot be worked economically by means of steel tools. The latter become worn rapidly, losing their shape and dimensions to such a degree and extent that the work produced becomes inaccurate, causing constant interruption of operation, loss of time, and the use of new tools or frequent regrinding

FIG. 1.

or shaping of the old ones. This causes great expense and delay in production. The great friction produced by cutting materials in some cases draws the temper of steel tools, making them useless. Hard rubber, paper and hardened steel cannot be readily worked by use of steel tools, as is also the case with hard stone. In these cases a much harder material is required, and for this reason diamond is used. The diamond which is used is of two kinds, totally different in appearance and quality.

Black diamond has a very dark purple brown color, is an amorphous, granular stone with rarely any crystallization visible or traceable, and is called carbon or black diamond. It is the hardest material known and has great strength.

Bort is entirely crystalline, and generally transparent and of all colors of the rainbow, as well as clear and transparent as glass. The latter is considered of greater hardness than all other bort except some which is almost black. Bort is extremely brittle and is readily fractured or "cleaved" in the three directions of its cleavage planes parallel to the sides of the octahedral crystal, in which shape it is most commonly found. The dodecahedral crystals are also readily cleaved in a similar manner.

In spite of the very great hardness of all kinds of diamonds, they are readily sawn, drilled, cut and polished; carbon (black diamond) cannot, however, be polished, as is the case with bort. Diamond cuts diamond, while steel saws and drills and

FIG. 2.

cast iron discs charged with diamond dust are used for the other operations. All kinds of grinding wheels, being made of extremely hard materials, are most readily kept free from filling or glazing and in perfect shape by diamond tools. In certain classes of work, where great accuracy and precision are primary requirements, or extremely fine lines are essential, the diamond is the only material that answers the purpose. Thus lithographers, engravers and scale-makers use them for fine work.

*Presented at the New York meeting, December, 1904, of the American Society of Mechanical Engineers. Mr. Henning is manager of the Steel Set Diamond Co., of New York.

There is another very important field of production in which diamond is all but imperative to obtain satisfactory results at reasonable cost, viz., that of wire drawing. Formerly all small wire was drawn through holes in hardened steel plates, but these wear so rapidly that the wire soon loses its calibre and becomes unround. As it is all-important, especially in electric work, that the wire be of absolutely uniform size, so as to maintain constant resistance and permit symmetrical distribution of weight about spindles and shafts, it became necessary to use a material harder than steel, and hence diamond was again resorted to. This made it possible to avoid delays in replacing worn dies, and because of the great permanence of accuracy of the calibres of the holes in the diamonds, materially reduced the cost of producing fine wire of copper, brass, steel, iron, nickel, and of other metals.

It is of course well known that stone is drilled and sawed by the use of diamonds, these having been used in core drills, which, in an extreme case, have cut solid cores of about 21 in. diameter. In diamond drills, stone saws and grinding wheel dressers, the rough diamond is used in appropriate holders, set either by staking, brazing, soldering, or by casting molten steel around the diamonds.

A peculiar property of the diamond is that it can be plated like any metal; this property is made use of in the galvanoplastic setting. The galvanoplastic setting consists in first plating the diamonds and then casting other molten metal around them, which alloys with the deposited metal. Thus an absolutely firm and rigid setting is produced.

Very high temperature does not affect the diamonds either in their hardness nor, when sound, in their solidity, and does not produce checks or other flaws. A temperature higher than

FIG. 3.

that sufficient to melt steel will, however, burn the diamond, and that of the electric arc will do so readily.

The diamonds in tools used for doing accurate work are, however, all "shaped" by cutting and polishing, so as to imitate the customary shapes of steel tools.

Glass and china are also drilled by shaped diamonds, in which case a triangular splint is generally provided with a flat triangular pyramidal point, as shown at Fig. 1, which, when using turpentine as a lubricant, penetrates glass and china more readily than any other tool, and lasts for from one to two years, unless broken by carelessness or accident. Fig. 1 shows a round-nose tool. The diameter or curve of cutting edge and its clearance from a right angle can be produced at will. Fig. 2 shows a sharp-nose tool, and in this again the angles can be varied at will. Fig. 3 shows a square-nose tool, which is used mainly for producing very high finish of hard rubber. Fig. 4 is a tool commonly used for turning paper calendar rolls, which must be very accurate and smooth. A piece of black diamond shaped as a round-nosed tool is simply clamped in proper position between two pieces of steel.

Tools shown at Figs. 2, 3 and 4 are most commonly used for turning hard rubber, because the diamond lasts a very long time without wear and produces absolutely smooth and accurate work, while steel tools wear off in a few minutes at most and get very hot. One other reason why it is economically advantageous to use diamond tools for turning hard rubber is that very high speeds can be used, 450 to 500 feet per minute being common.

It may here be added that diamond tools are most suitable for working carbon used for electrical purposes.

Fig. 5 shows a diamond die for drawing wire. This is a bronze block in which is set a diamond perforated by a tapering, polished hole through which the wire is drawn. This wire die is shown in section in order that its construction may be clear; in the most improved setting steel is cast around the diamond to prevent its bursting, and bronze is then cast around the steel setting to prevent corrosion of the steel by the substances used to lubricate the wire as it passes through the die. The holes in these diamonds are rarely made larger than .064 in. diameter, because steel draw plates or dies are considered sufficiently accurate and economical for larger sizes, and be-

FIG. 4.

cause of the great cost of diamond dies. The smallest dies which have come to the notice of the writer had holes of .001 in. diameter, although clients have called for calibres as small as .00045, .00055 and .00065. It is common practice to make the holes in diamond dies accurate to a .0001 in., which to many engineers may seem almost impossible, and is therefore here mentioned.

In drawing copper wire, it is customary to draw a .064 wire in one pass from a rough wire of .072 diameter. Smaller sizes are then produced by the following consecutive reductions: to .053, .045, .040, .036, .032, .028, .025, .022, 0.20, .019, then by 1-1000 down to .0075 and by half-thousandths down to .001.

It may be mentioned that diamonds wear increasingly when drawing the following metals in the order stated, viz.: gold, silver, copper, brass, bronze, platinum, soft steel, nickel, iron and crucible steel (piano wire).

In order to show why such expensive material as diamond can be used economically it may be stated that diamond dies wear up to eight years under constant use. One die of .004 calibre has, according to the record, drawn over 550,000 pounds of soft copper wire.

Diamond drills for drilling glass wear from one and one-half to two years before requiring recutting.

As is well known, diamonds are also used for spindle bearings in watches, and most recently have been introduced as cupped bearings for the pivots of electric meters, because they

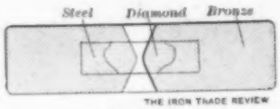


FIG. 5.

produce the minimum of friction, and do not wear out in many years.

Another purpose for which diamonds are used is that of drilling teeth, especially artificial teeth. In these drills minute chips of diamonds soldered into steel shanks are used. These diamonds are not prepared in any manner, as their points and edges when properly selected are sufficiently hard and sharp to penetrate bone and porcelain. The shapes of chips most generally used are flat, triangular points and three-sided pyramids. The most perfect drills for this purpose have diamonds of triangular section with a pyramidal polished point.

A petition in involuntary bankruptcy has been entered against the Tunblin Engineering & Foundry Co., Creighton, Pa.

STORAGE AND RECORD OF ELECTROTYPES.

BY LUTHER G. STEBBINS.

It is probable that in a great many offices where there is a considerable number of half tone cuts, electrotypes, wood cuts, etc., no satisfactory arrangements are made for their proper handling. Electrotypes accumulate gradually, and if no arrangement is made at the outset for taking care of them the whole business is allowed to go along in a slipshod manner. In many places the cuts are tumbled promiscuously into drawers, and when any are wanted a clerk must spend quite a little time in searching for the one required, often resulting in a disappointment, owing to the fact that the supply has become depleted.

The writer has recently seen and had charge of one of the best methods of storing and recording electrotypes and half

June 2	6 Electros @ 7.50	July 8	M M & M New York	Rec'd Aug 17 1904
	75¢ Ea.		1 Electro	
		July 17	C. J. & S. Co. Cleveland O	
			1 Electro	

THE IRON TRADE REVIEW

FIG. 1—FRONT OF ELECTROTYPE RECORD CARD.

tones, that has come to his attention. It is especially useful for manufacturers who must carry a good many cuts in stock, and upon whom there is always a demand from jobbers for cuts to illustrate catalogues, etc. The system is very easily handled and yet a complete and accurate record can be kept.

The cuts are placed in boxes, each measuring about 12 in. long 6 in. wide and 4 in. deep, with sliding covers. The boxes are numbered consecutively and the cuts in each box bear the corresponding number. When a certain cut is wanted one has simply to locate the number, go to the drawer or box and take it out. A collection of the printed matter of the concern should be made, and each cut marked showing the number of the cut and the box in which it is placed. The boxes are in a frame so that they pull out, and the size of boxes mentioned above will accommodate all the cuts any firm ordinarily carries; but if larger cuts are in stock special boxes can of course be made to receive them.

No 58	Sectional View	A. Mugford
	Head Stock No 28	Hartford Ct.
	Engine Lathe	

THE IRON TRADE REVIEW

FIG. 2—BACK OF INDEX CARD.

A card index is operated in connection with the system, and a card for each cut has its description, with the number, and shows from whom purchased. The front and back of a sample index card are shown in Figs. 1 and 2. A very quick location of cuts can be made in this way, and as in the case of the vertical filing system the one having charge of the electrotype case will very quickly memorize the location of a great many cuts. On the reverse side of the card is kept a record showing when the cuts were obtained, the cost, to whom loaned and when returned. A glance at this will show how the supply of certain electrotypes stands, how many are owned, number in stock, and how many are loaned. This will enable the clerk to keep up stock, and to follow up parties who have borrowed cuts and failed to return them when through with them. There is nothing expensive about this arrangement, and the boxes and frame can be easily made by the shop carpenter.

SOME LONG ENGINE RUNS.

The record run of the Westinghouse steam turbine at the World's Fair announced in *The Iron Trade Review* of last week is apt to suggest corresponding performances of reciprocating engines. An impression that the Straight Line Engine Co., of Syracuse, N. Y., had built an engine with an even longer continuous performance to its credit suggested an inquiry and Prof. John E. Sweet, president of the company, kindly sent the following characteristic reply:

"I have to say that one of the Straight Line engines at the works of the Solvay Process Co. at Detroit, ran—as they say in a report to us—forty-four weeks without stopping. But if we were in your place we would tell the whole story and say that they do not all go alike, and further that there was an engine sent out from England to one of the colonies that ran six years without stopping. I am under the impression that they told me at Smethwick, a suburb of Birmingham, that the old Watt engine pumping from the low to the high level canal had run a much longer time without stopping. It had at the time I saw it been running 98 years and I think kept at it for many years longer."

The pumping engine built for the Birmingham Canal Navigations of Birmingham, Eng., is still in existence and a photograph taken of its original setting is in possession of *The Iron Trade Review* and is here reproduced. This engine was designed by James Watt and he prepared the working drawings. It was made under his supervision in the year 1778 by the firm of Boulton & Watt at the famous works, the Soho Manufactory, near Birmingham, and erected at Smethwick close to the Soho Works. It has been visited by many eminent engineers, including Smeaton, who was commissioned by Watt to conduct experiments with a view to the determination of the coal consumption. The cylinder is 32 in. diameter, the length of stroke 8 ft. and the steam pressure only 15 lb. per sq. in.

The Soho Works had the probably unique experience, considering the interval of time, of receiving an order from the Canal Navigation Co. in 1898 to replace this relic of the 18th century with two triple expansion Corliss deep well pumping engines. These are of the most modern type and are now installed in the Walsall plant.

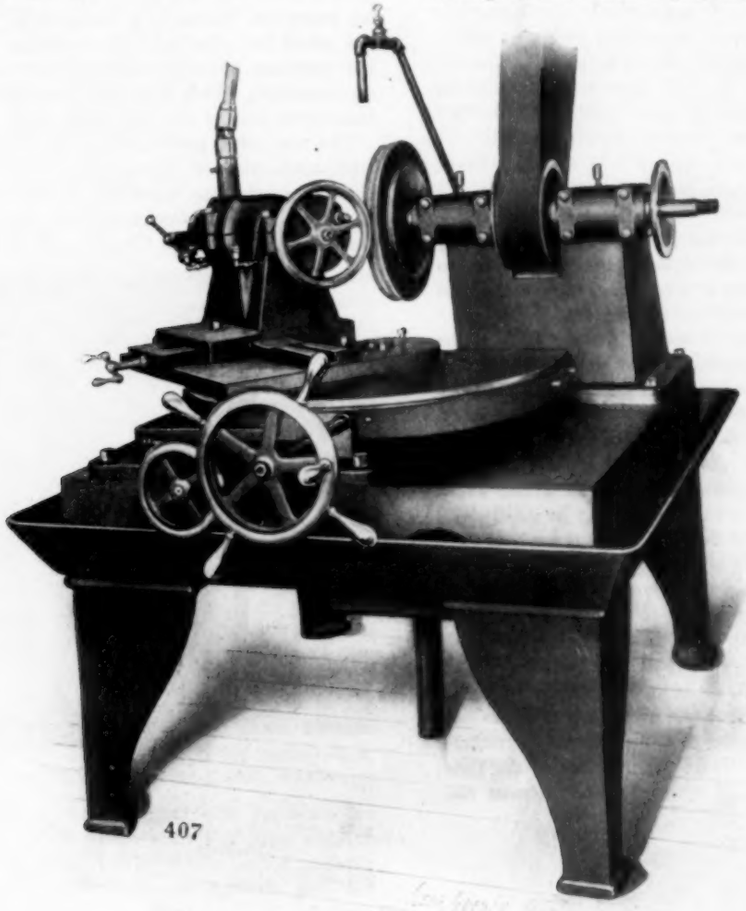
THE OLD PUMPING ENGINE AT TIME OF REMOVAL TO SMETHWICK.

The old pumping engine shown in the halftone, was regularly working until the year 1892. It was then carefully taken down and at this time photographed as illustrated in the engraving. The pumping engine has since been re-erected at the Birmingham Canal Co.'s Ocker Hill Works near Tipton where it will be protected from injury. Arrangements have been made whereby the old engine can be set in motion when desired.

HAND WHEEL GRINDING MACHINE.

The object of this machine is to finish the rim of the hand wheel from the rough at one operation, ready for the buffer, without machining it with a tool. The bed consists of a planed casting 3 ft. 7 in. x 3 ft. 5 in., mounted upon a cast iron pan on legs.

The grinder head is fixed at the back of the bed plate. In front is a dove-tailed slide, having 17½ in. of bearing for the swivel slide. This swivel slide has a crossfeed to and from the grinder head of 13 in. Upon the swivel slide is mounted a second slide with its center fixed upon the swivel in line with the grinding wheel so as to center all diameters. A rotary movement is provided for the second slide by the pilot wheel shown in front of the machine.



A HAND WHEEL GRINDING MACHINE.

A cross adjustment is also provided for the head block carrying the hand wheel to be ground and the spindle holding the hand wheel is also adjustable so as to bring different diameters of hand wheels directly over the swivel center. The speed of the hand wheel to be ground is controlled through a universal joint driven from a variable speed countershaft. On certain hand wheels the time was reduced from one hour to nine minutes by the use of this machine. It was designed and built by the Lodge & Shipley Machine Tool Co. of Cincinnati

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The California Gas & Electric Corporation of San Francisco has just ordered from the Stanley Electric Mfg. Co., two frequency changing outfits of 5,000 k. w. capacity each, amounting to virtually 20,000 k. w. capacity divided between four machines operated as two motor-generator sets. These outfits are for use in connection with the contract which the California Gas & Electric Corporation has secured from the San Francisco Street Railway Co., and will change the 60 cycle current from the Bay County long distance line to 25 cycles for further distribution among the sub-stations of the street railway company. The contract awarded the Stanley company includes transformers of 12,000 k. w.

The Crocker-Wheeler Co., of Ampere, N. J., states that it has access to the designs of Brown, Boveri & Cie, on the following apparatus: Alternating current generators, induction motors, oil switches, switchboard apparatus, turbo-alternators and high tension devices generally. These celebrated manufacturers have been retained as consulting engineers on all these lines, and, in fact, on all their apparatus except direct current machinery. As the Crocker-Wheeler Co. has been engaged in successfully building and marketing direct current apparatus for the past 16 years, it has scarcely any interest in European machines of this character.

A. Semones, foundryman of Union City, Tenn., has made an assignment with liabilities about $40,000 and assets said to be much larger. The assignment came as a great surprise to the community and was attributed principally to the failure some months ago of the Flickinger Wheel Co., Galion, O., one of Semones' largest customers. The Galion company owed him at the time of its failure $55,069.

The Pyrometer in Blast Furnace Practice.*

BY S. H. STUPAKOFF.

The successful operation of blast furnaces depends largely upon proper regulation of heat. The blast must be kept at nearly constant temperature to obtain uniform results. The temperature of the gases at the top must be kept under control to insure regularity in the resulting product of iron. Besides, a hot top means waste of fuel. The operator should

FIG. 1.—LE CHATELIER PYROMETER FURNACE OUTFIT.

be able to ascertain at all times and immediately what is going on in his blast main, in his downcomer, and often times in the individual stoves. The only way to obtain these conditions is to equip the furnace with reliable pyrometers.

Various appliances have been in use for the purpose. Some were more and others less successful. One instrument had to make room for another; the principal ones used were Siemens' copper ball pyrometer, expansion pyrometers of various make, first Siemens' and then Callender's electrical resistance pyrometer, Uehling & Steinbart's pneumatic pyrometer and Le Chatelier's thermo-electric pyrometer. All had a fair show. Most of them are still used, though some only in isolated instances, gradually but surely to be replaced by those best fitted for the work.

As to the copper ball pyrometer, the reader is referred to the criticism of C. R. Alder Wright, contained in *The Iron Trade Review* of Sept. 8, 1904, p. 47, and which gives a fairly true picture of the situation. It may be supplemented by the remarks of Sir Lowthian Bell, made at the Pyrometer session of this year's Iron and Steel Institute meeting which was held at London, Eng. He said that he used the Siemens' pyrometer for the simple reason that he could get no other at the time; there was no other. He could speak with the utmost con-

FIG. 2.—GALVANOMETER.

fidence of the general accuracy of that very simple piece of apparatus. But they required a good deal more than that; they required to be able to ascertain what the temperature was at the various points of the blast furnace immediately.

The expansion pyrometer was also described in the article referred to above and further comments will not be made at this time. Electrical resistance pyrometers are good instruments for the determination of the lower ranges of high temperatures. Used intermittently they are undoubtedly suitable for measurements up to the highest limits occurring in the gas and the blast mains. As permanent pyrometers under continuous use, they are apt to give more trouble than others in blast furnace practice. They must be applied at a disadvantage; their delicate portions are more exposed, and quite naturally easier damaged. The nature of their construction requires that a considerable portion of the instrument which contains the fine wire platinum resistance coil and its mica supports should be exposed to the source of heat which is to be measured. This makes it necessary to introduce the effective part of the instrument for some distance into the blast pipe or downcomer, as the case may be, which is not so essential with other types of instruments. They can withstand rather less hard usage than others, and consequently they have not as good a show, and a shorter life. Dr. C. W. Weidner says in his paper on "Methods of Pyrometry:" "Much controversy has arisen as to the relative advantages and disadvantages of the platinum resistance thermometer and the Le Chatelier thermocouple, which it seems is entirely unnecessary, as each instrument has its own particular field in which it excels."

The pneumatic pyrometer enjoys, contrary to the former, a wide application in blast furnace practice. It was the first practical instrument, especially devised for this purpose, which combined with its mechanism the very desirable feature of furnishing autographic records. Its inventors are metallurgi-

FIG. 3.—GALVANOMETER IN GLASS CASE.

cal engineers who have an excellent reputation among blast furnace men, and their apparatus is undoubtedly a very ingenious device, which, until recently, was the only instrument fulfilling all requirements. The photographic recorder devised by Sir Roberts Austen was by far less convenient, and a comparison of both may have prompted Prof. Arnold to remark at the Iron and Steel Institute meeting referred to, that the Uehling was the best recording instrument, so far as he could judge. Of course, it gives the readings immediately when wanted, it does not require the developing of photographic films, no dark room, no photographic outfit and no expert in photography. Little or no objection was raised to the necessary steam, water and air connections, which are essential with the pneumatic pyrometer, inasmuch as there is always an abundance of supply of either one of these mediums at hand at the immediate neighborhood of its application. But it should be remembered that all these connections must be kept perfectly tight to insure a satisfactory working of the pyrometer. It is also of importance that the filter interposed between the blast must be cleaned regularly, and likewise that the bore of its minute air nozzle, which measures about 1-32 of an inch, be kept permanently clear to insure absolute satisfaction. The use and applicaiton of this pyrometer is well known and has been described in various

*Read before the Pittsburg Foundrymen's Association.

periodicals but little has been published of the practical application of the Le Chatelier pyrometer. I will therefore enter into a detailed explanation of this instrument and give some of the results of his personal experience.

The thermocouple is enclosed in a tube, which, according to circumstances, may be made either of porcelain, of nickel or of an iron pipe. It is closed at its extreme end and secured with its other extremity to a double handled plug, which fits with gunlock thread in a flange that has been firmly secured to the iron shell of the respective blast or gas mains where the temperature is to be measured. A 1-in. hole through the iron

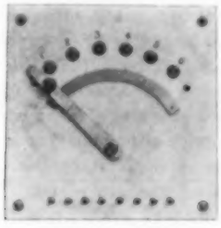

FIG. 4.—SWITCHBOARD.

shell and brick lining gives ample room for the introduction of the pyrometer with its protective covering.

A short nipple extends outwardly between the two handles of the gunlock plug and continues with the intermission of a union in a curved piece of iron conduit, which carries at its downwardly pointing end a porcelain fitted terminal box containing the connections between the thermocouple and the copper conductors which lead to the terminal posts of the galvanometer or millivoltmeter. Electric insulation between the individual wires of the thermocouple is effected by a double bore refractory tube which reaches from the extreme interior end of the protection tube through the plug to about the place of the aforementioned union. From hereon to the binding posts of the terminal box they are covered with asbestos tubings, which are suitably secured to the refractory tube and to the ends of the couple.

The galvanometer is placed on a solid foundation which is guarded against shocks or trembling from any cause, and contained in a glass case with tight fitting cover. It is generally placed in an undisturbed corner of the dog house or in any other convenient location in the neighborhood of the furnace. The insulated copper conductors connecting its terminals to the thermocouple are selected of sufficient cross section to keep their resistance to and fro within the limit of one ohm.

If more than one pyrometer is used at the same plant, they are all electrically connected to the same galvanometer by the intermission of a suitable switchboard. The changing of the reading from one station to the other is effected by simply moving the switch lever handle to the corresponding knob. The switchboard is wired up in such a manner that the galvanometer needle will slowly return to the zero mark when the handle is turned to its stop. But it is not necessary to stop the needle after each reading, it can be, and it is preferably shifted from one station to the other as may be required, and between the readings it may remain on either one of the more important stations, as the gas main or the bustle pipe, which in this case will be always ready for immediate inspection. The galvanometer needle corresponds instantly to the shifting of the switch handle, and no time whatever is lost by its assuming the requisite position. The temperatures of six pyrometer stations can therefore be read easily within the space of a single minute. Any number of pyrometers can be connected in this manner with like convenience to the same direct reading galvanometer.

If a recording instrument is used for the autographic indications of the temperatures it is preferable to place it in the superintendent's office or in the laboratory. Distance between the pyrometer stations and the galvanometer does not cut much of a figure. In one instance such a recording instrument was placed 800 ft. from the furnace, and it worked as promptly and accurately as if it had stood within 10 ft. But in such a case it is always advisable, though not essential, to retain a direct reading galvanometer for the information of the men in charge of the furnace in close proximity of the same. Both instruments will indicate simultaneously the same temperature. For obvious reasons it is always preferable to locate the automatic recorder out of reach of the furnace operator.

The records of the recording instrument are traced on a continuous strip of paper which is contained on a single roll lasting several months. Each morning or evening a day's record may be cut off and serve as a telltale of the continuous working of the blast furnace.

The recording instrument furnishes ordinarily only a single record, that is, it gives the temperature conditions of a single pyrometer station only. If it is desired these records may be multiplied for two or more pyrometer stations by the intermission of a specially constructed commutator arrangement, which changes once a minute from one station to another. In this manner it is possible to obtain simultaneously the records of both the gas and the blast mains. Portions of single and multiple records are shown in Figs. 6 and 7.

The maintenance of the Le Chatelier pyrometer amounts to practically nothing. All that is necessary is to leave the galvanometer undisturbed. Protect it from dust and leave it alone. Keep the temperatures of the air and gas within reasonable distance from the prescribed limits by being guided by the galvanometer readings and there will be no trouble with the protection tubes of the thermocouples, even if they are made of iron. To make sure that they are in good condition give the gun-lock handle a half a turn to the left, withdraw the tube and examine it, say once in a week or in a month, according to circumstances. Replace it in the same manner if it is found to be in good condition. The whole operation does not take more than a minute, and there is oftentimes an opportunity to perform it without interfering with the regular run of the furnace. If necessary it can be even done without much inconvenience with the full blast on. Keep a threaded plug handy which fits the female thread of the flange and make temporary use of it if it should be actually necessary to make some repairs to the protection tube or to the pyrometer itself. However, there was only a single instance in the writer's experience where these means were resorted to, ever since the

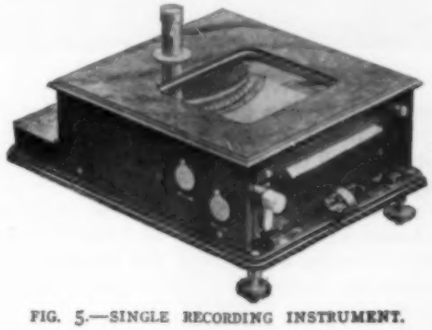

FIG. 5.—SINGLE RECORDING INSTRUMENT.

introduction of this instrument in blast furnace practice in this country.

There is so little intricacy connected with the use of the Le Chatelier pyrometer, and the thing itself is so exceedingly simple, as in its principal parts it consists only of the thermo couple and of the galvanometer, the one for generating and the other one for indicating the feeble thermo current, that if these are kept in good condition and no mechanical injury is done or sledge hammer practice is used with the necessary common fittings and connections, the entire outfit will give continuous

good service and excellent satisfaction. If the installation of a La Chatelier pyrometer has been carefully executed by a reliable man who has had experience in this class of work, there is no cause whatever to fear that it will require frequent repair, or that it will give out or give unreliable indications. One of the best qualities of the platinum, platinum-rhodium couple is its constancy if it is protected from the gases of combustion when above red heat. Direct contact with molten metals destroys it. Even molten tin, which fuses at 232 degrees C. or 450 degrees F., will melt platinum at red heat like wax, though its fusing point lies at 1,780 degrees C. or 3,236 degrees F. Above 3,000 degrees F. it is not safe to use it. With reasonable care it will give practically the same indications after years of use as on the first day. The report for the year 1902 of the Physikalisch-Technische Reichsanstalt, of Charlottenburg, near Berlin, Germany, which is universally acknowledged as the highest authority on such matters, contains among others the statement that thirteen thermo couples had been returned to them for retesting. Most of the thirteen were found unchanged, though they had been put to hard use. One of these had been in use since 1896, exposed to the flue gases and flames of a boiler. This indicated eight degrees too low at

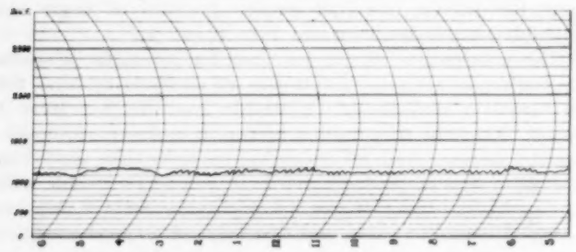

FIG. 6.—SINGLE RECORD OF BOTTOM OF FIRST HOT OVEN OF PLATE GLASS LEHR.—LE CHATELIER PYROMETER.

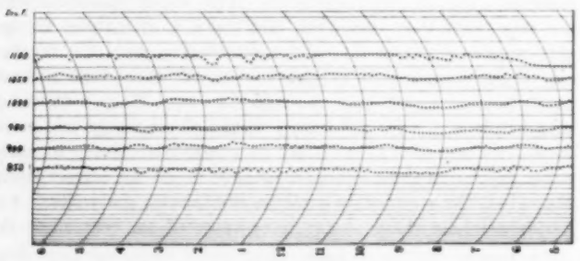

FIG. 7.—MULTIPLE RECORD OF TEMPERATURE IN ARCHES OF FIRST SIX STATIONS OF PLATE GLASS LEHR.—LE CHATELIER PYROMETER.

1,000 degrees C. Another used in a coke oven flue since 1897 indicated 17 degrees C. too low at 1,000 degrees C. These were the worst cases, and in both of them the fused joints had been repeatedly renewed.

As to the accuracy and reliability of the instrument Prof. Roberts-Austen said in his paper on "Recent Advances in Pyrometry,"* that he was satisfied this thermocouple can afford trustworthy results, accurate to one degree, at temperatures of over 1,000 degrees C.

Prof. H. M. Howe in discussing Prof. Roberts-Austen's paper said:† "Le Chatelier's pyrometer is certainly a most convenient and accurate instrument for the laboratory and one that may be used†† under some condition in the mill. I have used it for several years with great satisfaction. Like Prof. Roberts-Austen, and unlike Herr Blass, I have always found its indications remain constant over long periods. * * * Variations in the temperature of the room affect the readings of the instrument far less than one would expect."

*Trans. Am. Inst. Mining Eng., Chicago meeting, 1898.
†Trans. Am. Inst. Mining Eng., Feb., 1894. Vol. XXIV, page 798.
††It has been used since quite extensively in practice.

THE HANCOCK VALVES.

The Hancock globe, angle 60 degrees, and cross valves are made screwed and flanged in sizes up to 3 in. Under test the bodies of these valves stand a pressure of 4,000 lb. per sq. in. without breaking and are tight with a water pressure above 1,000 lb. per sq. in. That the valve seat may be hard and durable, the body, Fig. 2, is made of a specially hard and tough mixture. The discs are of a special mixture which does not contain any zinc. The spindles are of Tobin bronze, so as to prevent cutting under high steam pressures.

From the accompanying sketch of a 1 in. globe valve it will be seen that the most contracted part is of full size, there being no reduction of area for the purpose of lessening the weight. The two collars upon the stem guide the disc nut and compel the disc to seat squarely. The valve seat is flat. The valve disc has a projection on it which serves two purposes—it acts as a guide when the seat is ground and the lip prevents the cutting of the seat by the wire-drawing of the steam when the valve is slightly open. When the valve is slightly raised from its seat, as shown in Fig. 1, escaping steam cleans the seat, so that when the valve is seated all foreign matter has been washed or blown away.

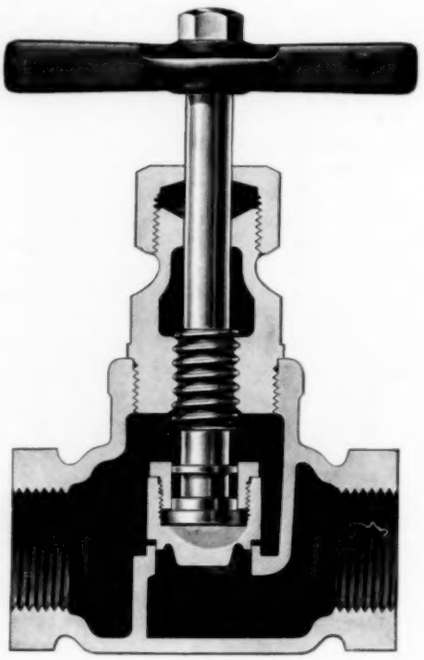

FIG. 1.—THE HANCOCK VALVE.

The bonnets of the valves are made with a long thread engaging the body of the valve, and the shoulder on the bonnet is made narrow. By means of this narrow seat on the shoulder it is possible to keep the bonnet tight, but the bonnet may be unscrewed when desired. In regrinding the valve the bonnet is removed, the disc nut unscrewed from the disc, and a piece of wood can be inserted in the disc, as the projection on the latter acts as a guide.

The tee handle, Fig. 3, is a popular novelty and all valves sent out are so equipped. The illustration shows the method of attaching the handle. The hole is made tapering with one side flat and the spindle of the valve is also made tapering with one side flattened to receive the handle, the tee handle being held on the spindle by means of a nut. The flattened side holds the handle rigidly and the taper enables the parts to be drawn tightly together.

These valves are made by the Hancock Inspirator Co., whose general office and salesroom is at 85-89 Liberty street, New York, with a Western branch office and salesroom at 22-26 So. Canal street, Chicago. The factory at Boston has been thoroughly described in *The Iron Trade Review*.

VARIABLE SPEED MOTOR APPLIANCES.*

BY C. R. RENO.

The application of individual motors for machinery is of such variety that it will be impossible to more than touch upon this subject generally. Motors for such purposes are nearly always special, either as to speed or windings. It is often possible to use or combine standard parts, but the regular commercial motor as built for ordinary stationary work can seldom be used to advantage.

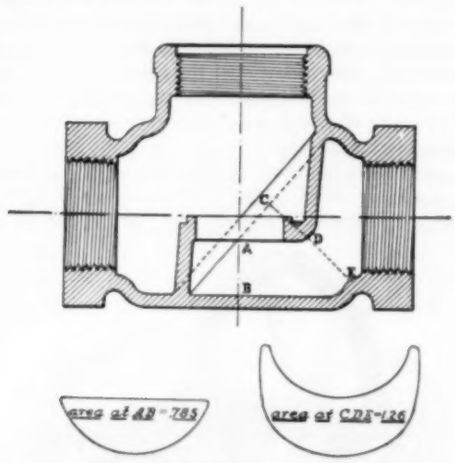

FIG. 2.—SECTIONS THROUGH BODY OF VALVE.

The two types of motors commonly used are the constant and the variable speed. The constant speed motors drive woodworking machinery, planers, punches and all tools where the variable speed is accomplished by speed changing devices in the machine tool itself.

Constant speed motors are made in two windings, compound and shunt. The compound motor, while not having as good speed regulating qualities as the shunt, yet has a far greater starting power, and will stand rougher work. A compound motor will seldom regulate better than 8 to 10 percent between no load and full load, while a well designed shunt motor of reasonable size will regulate as close as from 3 to 5 percent. While the regulation of the compound motors seems rather poor, yet in practice the variation is seldom noticed, due to a large portion of the load being always on it in the friction of the machine it drives. In printing presses over 80 percent of the full working load is used in operating the press empty. Compound motors are a combination of shunt and series. The shunt winding gives the regulation, and the series provides great torque or starting power.

Street car motors are all series wound, and if they were run without load they would attain such a speed as to fly to pieces. You all know what rough handling they will stand It is this quality that makes the compound motor so desirable in many cases.

Woodworking machinery, with few exceptions, elevator motors, iron planers, punches, shears, in general high speed and other machinery requiring great power in starting, should be driven by compound motors.

We have a press in our shop which punches out copper segments for commutators. It was driven from a 30-in. pulley on line shaft by a 5-in. full twist belt and was always giving us trouble, either pulling the pulley loose on the shaft or throwing the belt off. We decided to belt a motor to it, and when we came to the size there was quite an argument.

One foreman thought a 7½-h. p. was needed, but I decided to try a one h. p. with heavy compound fields. This was done and it has pulled the press without a hitch for the past eight months.

Yesterday I made a test and the maximum power required was a little less than the motor rating. This small amount of power is due to the motor slowing down slightly, when the press is cutting, which, of course, lets the flywheel do the work for which it was intended.

A compound and a shunt motor can be compared about the same as a hill horse and a thoroughbred. The former, when it comes to a hill or hard work slows down, and pulls without hurting itself. A shunt motor, when it comes to a hill tries to go up it at the same speed as on the level. It will operate at practically the same speed with a load two or three times its capacity if fused heavily enough. However, do not think from the above that the shunt motor is not fitted for machine tool work. In driving lathes, boring machines, drill press, milling machines and other tools not requiring excessive power in starting it is unsurpassed and is generally used.

As to the variable speed motors, there is a number of different types. The multiple voltage system uses an ordinary motor, with three or more different voltages brought to the armature. The speed of the armature varies with the different voltages, and the intermediate speeds are secured by field control. While this system gives a wide speed range, it has a number of disadvantages. First, it requires a special generating plant to obtain the different voltages. Second, the wiring is complicated, requiring three or more conductors to be brought to each motor. The motors also require an expensive controller.

Another method is the double commutator arrangement, which consists of an armature having two separate similar windings, which can be connected, either in parallel, or in series. This gives a 2 to 1 variation without the field control. Field control is used to lap the speeds. It also has the disadvantage of requiring an elaborate controller, and has two commutators to be looked after. Another system is the double wound armature, having two separate windings of a different number of turns. A ratio of 4 to 1 can be secured in the motor, by different connections of the two windings. However, it also has the same objection as the preceding in having two commutators and an expensive controller. The Stow variable speed motor, which has movable plugs in the pole

FIG. 3.—TEE HANDLE AND VALVE STEM.

pieces, gives good results, but the mechanical arrangement for moving the plugs is inconvenient.

The most popular arrangement today for variable speed is the motor controlled entirely by resistance in the field. It is being built by a number of companies with a range up to 3 to 1. The only objection to this type has been that some builders have rated their motors so high that they are unfit for commercial work, due to excessive sparking at the higher

*Read at the meeting of the Cincinnati Metal Trades Association foremen's meeting. Mr. Reno is with the Triumph Electric Co., of Cincinnati.

speeds. It is well known that if the speed of a motor is increased by placing resistance in the field, the rating of the motor should be decreased in proportion. A 10 h. p. motor at 500 r. p. m. is only an equally good 5 h. p. at 1,000 r. p. m. when using field control.

Manufacturers take advantage of the overload capacity of their motors, as well as the intermittent character of machine tool work. They are able in this manner to rate their field controlled motors much higher than would otherwise be possible, and still furnish one that is satisfactory. The rating is purely a matter of the individual judgment of the builder. The firm with which I am connected has just brought out a new line of motors of this type, and I know how difficult it is to keep from over rating them. We are rating them at a point where they will carry full load at highest speed continuously, without marking or burning the commutator. They also carry 25 percent overload without injury for short periods.

By referring to the tables given out by the different manufacturers, it will be noticed that the horse power ratings follow no rule as to the size of frame used. Some sizes are rated the horse power they would give as standard motors, with a range of speed of 2 to 1. In other sizes the horse power decreases as the speed increases. Again the horse power varies in the different voltages as much as 20 percent. This irregularity proves that each size is put under test and rated what it will do. The variable speed motor of the latter class has small overload capacity. This is due chiefly to the fact that the trade calls for a small motor.

I have with me a drawing showing how a motor may be built very small and compact and yet have sufficient material in the magnetic circuit. The frame and pole pieces are cast steel, which makes the machine very light. The bearings while long do not increase the length over all materially, as they extend under the commutator on one end and armature windings on the other. This motor is built by the Triumph Electric Co. and is its latest type for machine tool work.

Old Type Locomotive for Purdue University.

Negotiations have been completed whereby Purdue University is to receive from the New York, New Haven & Hartford railway, through General Manager Samuel Higgins, the historic locomotive "Daniel Nason." A few years ago the university interested itself in securing from railways, samples of such classes of locomotives as are now being superseded by machines of more modern construction, its purpose being to preserve as museum exhibits types of design which were in danger of becoming extinct. As a result, a number of valuable relics are already upon its grounds. From the beginning of this movement an effort has been made to secure a representative of a type which was common throughout New England thirty years ago, namely, an 8-wheeled engine having cylinders inside the frames connecting with the crank axle. This effort has now been done. The "Daniel Nason" is said to have been built in 1858. It was exhibited in Chicago in 1893 and has since been held as a relic at Roxbury, Mass. The engine weighs about 25 tons, is complete with tender and will be shipped to the university at Lafayette, Ind., upon its own wheels. The university is also to become the custodian, in behalf of the same railway, of a stage-coach passenger car, which is said to have been placed in service in 1835. It consists of the body of a stage-coach suspended over a simple railway truck by means of thorough braces. It will seat inside and on its top about 20 persons.

The Davenport Locomotive Works, Davenport, Ia., have let the contract for the erection of a boiler shop, work on which is to be completed within 90 days. A new warehouse, 68 x 108 ft., will also be built. The company recently increased its capital from $100,000 to $200,000.

AN IMPROVED ROTARY SPLITTING SHEAR.

The maker of this machine points out that the chief advantages of the rotary over the stroke shear are: No time lost between strokes; the plate fed through the machine by the cutters; the cutting speed doubled, and the edge perfectly satisfactory.

The cutting on the rotary shear is done by two hardened tool steel cutters 15 in. diameter and 1⅜ in. thick. These cutters have milled edges to feed the plate through the machine. The large diameter of the cutters prevents distortion of light material under cutting strains and there is a resulting saving in power. The proper distance between the cutters is approximately one-half the thickness of the plate. In order to allow for this adjustment, the cutter hubs run loose on an eccentric shaft, by means of which the cutters can be adjusted for different thicknesses of plate.

The machine is built for cutting soft steel and iron plates of any length or width. The floor space is the same as for stroke shears of the same capacity and there is not the limiting

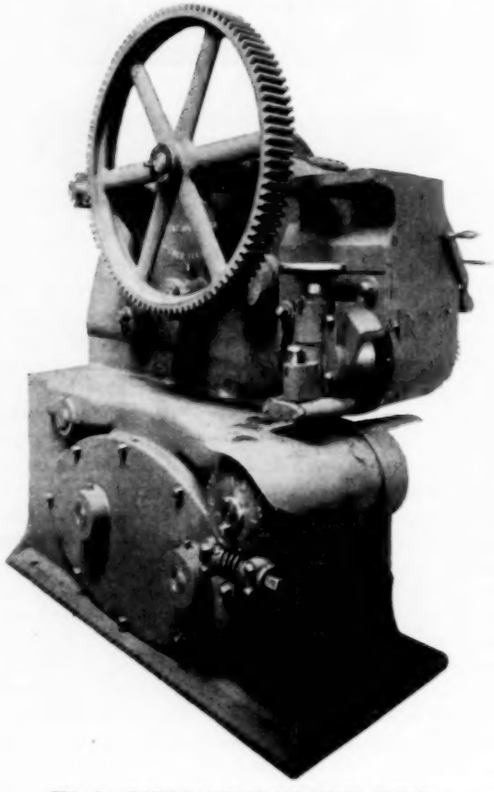

FIG. 1.—SCULLY ROTARY SPLITTING SHEAR.

depth of throat frequently found in rotary shears built on stroke shear lines.

In order to reduce friction all gears are spur gears with teeth cut from solid metal. All pinions are steel, with teeth cut from the solid. By making the upper and lower parts of this machine of box section, a very rigid tool is produced. This construction also allows the placing of all but two gears and two pinions inside the frame and the shears are practically dust-proof and noiseless. An adjustable hold-down prevents the plate tilting. This hold-down swivels when outside circles are trimmed. A crane pad is cast on top and at the front of the shears, so that a radial crane may be attached at this point to handle plates at the machine.

The views in Figs. 1 and 2 are from opposite sides of the machine. A large cover plate is on either side to facilitate inspection of the encased gears. On the belt driven machines a friction pulley is provided, 30 in. in diameter, 7 in. face, and

should run at 150 r. p. m. for a cutting speed of 8 ft. per min., which is about the limit of the operator's ability to handle the plate to the shears. The net weight of the belt driven shears is 12,500 lb. The direct motor drive can be used to advantage on these shears. A 10-h. p. motor is required for this duty.

The front view of the shears in Fig. 3, shows the two cutter shaft covers removed. All shafts and bearings are of generous size. The gear idlers inside the frame are brass bushed and oiled by compression grease cups on the end of the shafts. All other bearings are lubricated in the usual way by oil cups.

These shears are built in two sizes; one with cast-iron frame for cutting ¾ in. plate and lighter; the other with cast-steel frame for cutting 1 in. plate and lighter. They are made by the Scully Steel & Iron Co. of Chicago.

A certificate of incorporation for the International Iron & Steel Co. was issued at Washington on Dec. 23. The incorporators were Dr. J. H. Walker, George T. Walker and E. F. Walker, of New York, and the capital of the company is placed at $100,000,000. At the office of the company, No. 55 Liberty street, New York, Dr. J. H. Walker explained the nature and object of the International Iron & Steel Co. in

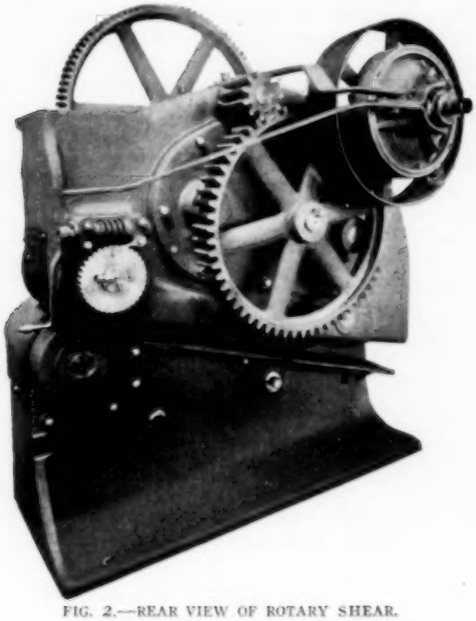

FIG. 2.—REAR VIEW OF ROTARY SHEAR.

view of some newspaper comment. He said: "I wish it understood that we are not professional incorporators, and we have nothing for sale. We have certain patents for steel, which will be produced cheaper than any heretofore, and which is of much better quality than any on the market. We expect to use a part of our stock to acquire certain plants, which we have in mind for the manufacture of our new steel. My father, George T. Walker, who is the patentee of this new process, is an old steel man."

The City of Decatur, Ind., at a special election, voted to give the St. Louis & Western railway a subsidy of $28,000 for the location of its shops in that city. The shops, now located at Delphos, O., will be moved to Decatur.

By direction of the referee a dividend of 2½ percent has been declared to creditors of the Elmira Steel Co., Elmira, N. Y., which makes a total dividend of 20 percent to date.

The Shelby Stove Mfg. Co., Shelby, O., has made an assignment. Liabilities $27,000 and assets, $15,000.

COSTS AND COST KEEPING.*

BY C. N. LAUER.

It is not my intention to give a description of any particular scheme of costkeeping, but rather to point out the value of such work to the manufacturer. The existence of a manufacturing establishment depends upon its ability to produce something of an exchangeable value at a price which will enable the management to secure a share of the market's patronage.

"The possibility of exchangeable value is everywhere present. For example, the unmined ore is a possible value but this possible value does not become actual value until after it has passed into human possession and assumed an exchangeable form through the expenditure of human labor, or labor directed by the oversight of man."

All of us are familiar with establishments which are com-

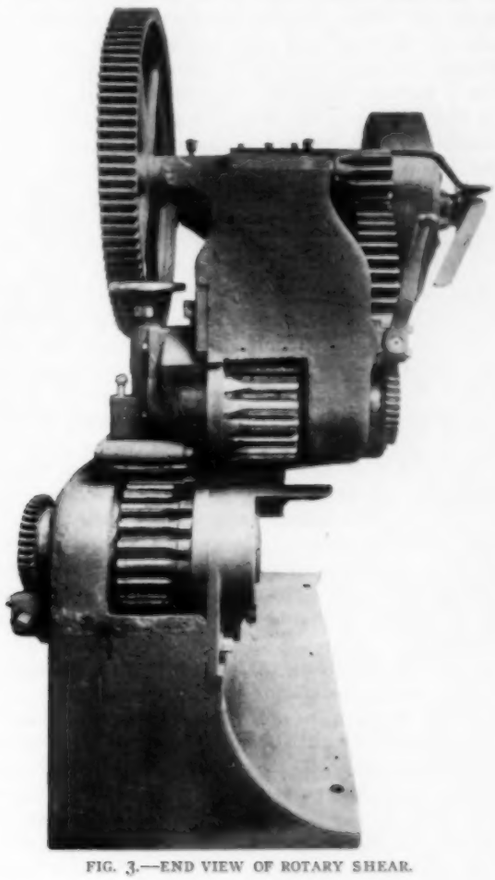

FIG. 3.—END VIEW OF ROTARY SHEAR.

monly called machine shops, and, as a consequence, we are interested in learning all we can about the factors which affect the cost of the material passing through such plants. The business of manufacturing steam engines, in which you are all interested, necessitates the ownership of a plant where the engines may be built. As something cannot be produced from nothing, material of various kinds must be secured and out of this material the engines must be formed. The changing of this material from one form to another makes necessary the employment of labor.

In any scheme of costkeeping the charging of material where it belongs is a comparatively easy matter if proper means of purchasing, receiving, storing and issuing it to the shops are provided.

Labor presents a more complex problem, inasmuch as it con-

*Read before the Engine Builders' Association at the December meeting. Mr. Lauer is with the shop management department of Dodge & Day, consulting engineers, of Nicetown, Pa.

sists of two kinds. There is, first, productive or direct labor: that is, the labor which can be charged directly to some particular production order or article of product. The accounting for this labor is comparatively simple, inasmuch as it can be charged directly to the product upon which it was expended. The second division of labor is that which is commonly called non-productive, or more properly called indirect labor, and consists of such items as salaries of officers, superintendent, foreman, janitors, etc. From its nature it will be seen how it is impossible to charge this against any particular product, so it becomes necessary to account for it on the costs in an indirect way.

In a general way we have accounted for material and labor, but there is still the plant which has not been considered. This plant represents the investment of a sum of money and the money so invested is tied up and cannot be made to operate in the open market and thus earn interest. If this investment is to prove profitable interest must be earned and be included as an item of cost. This is called interest on investment. The equipment of the plant will wear out and must be replaced so that sufficient money must be earned to pay for its replacement. It is but just that each customer should pay a proper share of this expense, which is known as depreciation.

Whenever money is invested in destructible property it is a wise and common practice for the owner to protect himself, by insurance, against loss in some form or other. This insurance costs money and must be included as an item of cost, and in the plan of expense classification is known as insurance.

The laws of the commonwealth demand that certain money be paid into the public treasury as taxes; these also become a part of the cost of manufacture. Breakdowns of the equipment will occur; parts of machines will wear out and need replacement; the whole plant will require that money be spent for its general upkeep, and this is known as repairs and maintenance.

The items which we have just considered, namely: Interest on investment, indirect labor, depreciation, insurance, taxes and repairs and maintenance, when taken collectively, are known as overhead expense or burden. They are all of such a nature that it is impossible to charge them direct against any particular piece of work. The question now arises, how is this expense of running the business to be placed against the cost of the product?

I stated in the beginning that it was not my intention to describe any particular scheme of costkeeping. My reasons for this are as follows: In order to fully describe a good system of costkeeping in all its important details it would take much more time than you have given me or would care to give. I can only say relative to the distribution of this expense that it is the one thing which makes or mars a cost system It may be done with such a degree of refinement as to make the expense of the work prohibitory, or it may be done in such a slipshod manner as to make it of little or no use to the manufacturer.

The common form of making this distribution is to find from the previous year's accounts the sum of all the items that make up the burden, and after this has been determined to find the ratio between it and the sum of the direct labor for the same year; then for each dollar expended for direct labor add an amount sufficient to cover the burden in the form of a percentage. Such a method is in error for more reasons than one. In the first place the percentage of burden has been fixed upon the results of the previous year's business and this results in an error which is perpetual. This percentage of burden fluctuates from year to year and from month to month. Your organization must be maintained through periods of business depression as well as in times when work is plenty. It is obvious that a percentage fixed as described above can only take such conditions into account in an approximate way.

The great shortcoming of the percentage method is that it totally ignores the time element. The burden properly chargeable against a given tool is twice as much for two hours as for one, and yet if a job were done today by a man earning 20 cents per hour and tomorrow by a boy earning 10 cents, the boy using the same machine but consuming twice the time, the amount of wages would be the same, hence the burden also This is wrong, since the boy used the machine twice as long as the man and the burden charged should be twice as much.

There are certain expenses incidental to the running of a manufacturing business which are clearly chargeable to the men and others to the machine. For example, heat and light are necessary for the men, while the power is consumed by the machines. All these items are not so easy to divide—the buildings are necessary for both men and machines, but there is a philosophy in all of this which enables a classification to be made of the burden and by this means to divide it into a man hour burden and a machine hour burden and in this way distribute it on the product in a just and proper way.

The principal use of cost is to enable the manufacturer to properly figure on new work and to enter competition with a knowledge that the prices quoted are based upon stable information. What is more disturbing than to enter a competition for business at a price which you are sure is correct and then find that one of the competitors takes the business at a figure which is below your cost price. This is the result of one of the following causes: Either your cost accounting or that of your competitor is in error, or your shop practice is bad as compared with his.

Times arrive when business is slack and it is a desirable thing for the manufacturer to take work at a small margin of profit, or perhaps at exact cost in order to preserve his organization. This cannot be intelligently done if his cost system is defective and does not properly record facts. The factors then which must be taken into consideration in connection with cost accounting are these: First, material. This requires intelligent direction of purchase, receipt, stores accounting, and stores issue. Second, labor. Here proper safeguards must be provided against fraud on the part of the workmen; wage rates, both day and piece, must be properly accounted for and charged. Third, the burden or overhead charges must be properly collected and distributed on the product; thus showing costs at their proper level. Finally, the facts in connection with these three items must be carefully deduced, collected and combined, as the best guide for future action is the experience of the past.

Corrosion of Wrought Iron and Steel.

Referring to the mooted question of the relative resistance to corrosion of wrought iron and steel the *Engineering News* says an interesting bit of evidence on the matter has just come from West Australia, where a large part of the water supplies carry more or less salt or alkali. It is stated that boilers for West Australia are now generally made of Yorkshire iron and last about three times as long as the boilers made of steel plates, which were formerly used.

In connection with the order issued by Judge George W. Wheeler in the Superior Court at New Haven, Conn., it is announced that Sears, Roebuck & Co., Chicago manufacturers of fire arms, will occupy the unused plant of the Meriden Malleable Iron Co., Meriden, Conn., and will employ about 1,000 hands. The court order was for the granting of a motion for foreclosure on a mortgage. The order clears the title to the property and permits its sale to the Chicago concern.

No. 1 Chicago & Northwestern ore dock at Ashland, Wis., will be torn down and rebuilt 14 ft. higher than at present.

The Western Machinery Market.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, Jan 3.

Nineteen Hundred and Five is ushered in under auspicious circumstances so far as the machinery trade is concerned. Most of the manufacturers in the West are busy on orders that have been secured since the presidential election, the improvement from that time to the present date being most marked. It would be idle to pick out any line of tools as enjoying a better demand than others, for the improved conditions existing embrace all classes of machinery equipment. Dealers and agents on South Canal street, who are generally the first to feel any downward or upward movement, are exulting in the bright prospects for an excellent business in 1905. Orders have been coming in very briskly since October 1, and while there is yet a scarcity of contracts for complete shop equipments, the aggregate of the orders for single tools makes a splendid showing. Prices are going up in proportion to the advances in the cost of raw materials, and there is a noticeable haste on the part of many consumers to get their deliveries before these costs are advanced to any great degree. For nine months of the year just closed, the machinery trade in all parts of the country was extremely dull, resulting in drastic reductions in prices which have only been partly recovered to date. That higher prices will rule in the near future is beyond doubt, in view of the constantly increasing costs of the raw materials.

Henry E. Pridmore, Chicago, manufacturer of sand molding machines, reports a brisk activity in all branches of his business. In particular, have orders been especially good from manufacturers of cotton ginning machinery, several of the largest firms in the country making this class of equipment having contracted in the past month for the installation of Pridmore machines in their foundries. The gasoline engine trade has also been active, some satisfactory contracts having recently been received for complete equipments of machines for making engine parts. Orders from manufacturers of agricultural implements and heating apparatus show no diminution. In connection with the latter, Mr. Pridmore has prepared a complete set of prints showing Pridmore machines fitted for molding all the different castings used in the construction of furnaces and boilers, which he will be glad to send to any who are interested. The capacity of his machine shop has been increased by the installation of a 72-in. Colburn Boring and Turning Mill and a Beaman and Smith No. 2 combined vertical and horizontal spindle milling machine.

Hanna Engineering Works, Chicago, report that inquiries for pneumatic riveters and foundry screen shakers are numerous, and that the indications are for a good business in these machines in the coming year.

Oregon Foundry & Machine Co., Oregon, Ill., has recently closed several orders for sand molding machines and has a number of others pending. For its various hardware specialties it has also experienced a good demand, the entire output of some lines being contracted for several months ahead.

The E. A. Delano Co., Chicago, manufacturer of pulley molding, drilling and tapping machines, etc., reports that its business has increased considerably since election day, and that it is now busy in all departments. The exasperating labor troubles which this company experienced during the summer are now a thing of the past, and for several weeks it has been running with a full complement of men.

Arcade Mfg. Co., Freeport, Ill., is having a good demand for the molding machines which it placed on the market about a year ago, and the company's officials are sanguine as to the outlook for future trade in this line.

Armstrong Brothers Tool Co., Chicago, manufacturer of tool holders, cutting-off and grinding machines, etc., states that its trade in the former specialty shows a steady increase. In the last few weeks shipments of a grinding machine, on which it was recently allowed a patent for the method of cutting-off self-hardening steel utilized in this tool, have been made to the Texas & N. O. Railway, Houston, Tex.; Charles Churchill & Co., Ltd., London, England; Pacific Tool & Supply Co., San Francisco, Cal.; Three Rivers Tool Co., Three Rivers, Mich.; and the Gisholt Machine Co., Madison, Wis.

Wm. Ganschow, Chicago, who makes a specialty of gear cutting of all kinds, has added to the capacity of his machine shop by installing a 42-in. Gisholt boring and turning mill, a complete plant for the planing of bevel gears, and a Gould & Eberhardt, entirely automatic rack cutting machine. These tools, Mr. Ganschow states, have greatly increased the scope of the work which he can handle, as well as enabling him to give to his customers the positive assurance of getting perfectly and accurately cut gears. It is the intention of the company in the coming year, to keep in stock various sizes of machine cut rack, cut from cold rolled annealed steel and straightened to make them serviceable for use in machine tools, on which he will issue a price list early in January.

Ransom Mfg. Co., Oshkosh, Wis., advises us that it has recently received orders for motor-driven grinders from the Pensylvania R. R. Co., two; Puget Sound Navy Yards, four; and the International Steam Pump Co., one. In addition to these, it has booked orders for disc and motor-driven water tool grinders from several other concerns. The company anticipates a brisk trade in the coming year, judged by the volume of inquiries.

Stiles-Morse Co., Chicago., the exclusive Western distributing agent for the sheet metal working machinery made by the E. W. Bliss Co., Brooklyn, N. Y., has recently closed a $25,000 order for the entire equipment for a new can plant at Kansas City, Mo., together with a large order for machines for a can factory in Detroit, Mich. In addition to these, its "pick-up" business, though mostly for single tools, has been very brisk, in the last two months. From the inquiries daily received, the company looks for a good business in the coming year.

Curtis & Co. Manufacturing Co., St. Louis, Mo., has recently completed the grading of a six-acre tract of land on which it will erect a new plant. This project has been under consideration for a year or more, but was postponed owing to the general apathy in business. The marked improvement which has been felt since the Presidential election, however, has convinced the company of the necessity of pushing to completion its new buildings as rapidly as the weather will permit in order to meet the increased demand for its product, which it believes will be felt in the coming year. The company's output consists of air compressors, pneumatic appliances, air hoists, saw mill machinery, etc., and the new shops have been especially designed for the manufacture of this class of equipment, furnishing double the present capacity.

Nordberg Manufacturing Co., Milwaukee, Wis., in common with others enagaged in the manufacture of engines, has felt a marked improvement in the machinery trade, and is confident the business of the new year will be equal to that of 1902.

Illinois Foundry & Engineering Co., Granite City, Ill., mention of the organization of which has been made in this paper, reports that its new foundry was placed in operation Dec. 1. It is laid out on lines similar to the Model Foundry at the St. Louis Exposition, having two wings, as well as a main building, though it was designed and under construction long before that plant was built. The frame work is of structural steel, with brick walls, the dimensions of the molding floor being 100x83 feet. Its capacity will be 20 tons a day. The

foundry is electrically operated throughout, its equipment consisting of a Whiting cupola; a 5-ton foundry crane made by Byram & Co., Detroit; Whiting patent core oven and air hoist, Franklin air compressor, and Chicago pneumatic tools. The company will make a specialty of machinery castings. The officers are: E. M. Miller, president and general manager, who designed the plant, and Arthur W. Price, formerly of the Bassett-Presley Co., of Cleveland, secretary and treasurer.

The Northern Electrical Manufacturing Co., Madison, Wis., advises us that it has found a notable improvement in business since election day, and from the fact that many of its orders have been hanging fire for some time, it believes a considerable amount of business was held up pending the result of the election. The company looks for a continued good trade in the coming year. Several noteworthy sales have been made recently in the mining fields, to breweries, and piano manufacturers, while its machine tool motor equipments and general industrial work have both been of more than favorable volume. The company finds that progressive manufacturers are accepting what it has long contended, that electric drive has a most important bearing on the economic operation of plants arranged for electric transmission, and are placing orders freely for electrical equipment.

The Kempsmith Manufacturing Co., Milwaukee, Wis., manufacturers of milling machines, states that in the last two months its business has materially improved and that the outlook for the machine tool trade is considerably brighter. The company has made several shipments of tools to foreign countries, the consignees being in Paris, London and Berlin. Domestic trade as evidenced by the scattering nature of orders and inquiries shows signs of good improvement, and while the orders placed are largely for single tools, the volume is such as to presage an industrial movement such as was felt two years ago.

Pawling & Harnischfeger, crane builders, Milwaukee, state the indications in the coming year are much better, and that the orders booked show a gratifying increase for November and December as compared with previous months. Prominent among their customers during November were the following: Bethlehem Steel Co., South Bethlehem, Pa., 4 cranes; Alexander Traud Co., Newark, N. J., 1 crane; Pennsylvania R. R. Co., Philadelphia, 1 crane; A. F. Bartlett & Co., Saginaw, Mich., 1 crane; Union Electric Light & Power Co., St. Louis, 2 cranes of double trolleys; Columbia Tool Steel Co., Chicago Heights, Ill., 1 crane; John Eichleay & Co., Pittsburg, 1 crane; Michigan Alkali Co., Detroit, 2 cranes; Benedict & Burnham Mfg. Co., Waterbury, Conn., 1 crane. The new Pawling & Harnischfeger plant at 38th and National avenues, Milwaukee, is now in nearly complete operation.

Whiting Foundry Equipment Co., Harvey, Ill., has just completed a roller table complete for one of the new mills being built by the Illinois Steel Co., at its South Chicago works.

Bignall & Keeler Mfg. Co., Edwardsville, Ill., says that the demand for pipe threading machinery is very good. Since the first of November, it has disposed of all its stock machines, and is now shipping 21 machines a month instead of the usual twelve.

Williams, White & Co., Moline, Ill., manufacturers of bulldozers, hammers, punches and shears, etc., answer our inquiry by stating that on the day our letter was received, it booked orders for one No. 7 bulldozer, one No. 5 drop hammer, one No. 17 punch and one No. 90 Justice hammer. It reports that inquiries are very brisk and the outlook for business in the coming year good.

Galena Iron Works, Galena, Ill., founders and machinists and manufacturers of mining machinery, have recently completed for the Platteville Lead and Zinc Co., Platteville, Wis., one magnetic separating plant at a cost of $10,000. It is also installing in the Franklin Mining Co.'s property, at Highland, Wis. an ore separating plant, and is completing for the Highland Mining Co., of the same city, two ore separating plants and one central power plant to operate the same. The value of these contracts exceeds $25,000, all of which were to be finished by January 1st. Since the company was organized about a year ago, it reports it has had an excellent business.

Stephens-Adamson Mfg. Co., Aurora, Ill., whose specialty is conveying and elevating machinery, reports that it has several contracts under way for the equipment of plants in Canada and Mexico. The president further advises us that he notes an extraordinary increase in inquiries for its line of goods both from the West and South within the last few weeks, which he takes as an indication that 1905 will see a marked improvement in business.

Wilmarth & Morman Co., Grand Rapids, Mich, advises us that the demand and sales of its "New Yankee" drill grinders since the first of November has shown a considerable improvement over the trade of former months this year. Among recent shipments, it mentions the following: Karr Supply Co., Belleville, Ill.; Kacer Mfg. Co., St. Louis, Mo.; Chicago & Milwaukee Electric R. R., Highwood, Ill.; Van Auken-Clevaue Co., Yonkers, N. Y.; Northern Central R. R. Co., Elmira, N. Y.; Penna. R. R. Co., Sunbury Shops, Pa.; American Steam Gauge & Valve Co., Boston; Penna. Steel Co., Steelton, Pa.; Mosley Lathe Co., Elgin Ill.; Montana Ore Purchasing Co., Butte, Mont.; Pattee Pow Co., Monmouth, Ill.; three to Australia and four to England.

The Chicago Pneumatic Tool Co., Chicago, has received an order from its London branch for 705 tools. In addition, the same office has closed a three years' contract with Bremer Vulcan, Vegsack, Germany, receiving a preliminary order for 117 tools, also a contract for the installation of pneumatic tools and appliances in the shipyard of the William Beardmore & Co., Dalmuir-on-the-Clyde, Scotland, the initial order from this concern being for 80 tools. An order has also been received by the London office from the Jamalpur railroad shops of India, for 2 Franklin air compressors and 50 tools. Domestic orders have greatly increased in the last two months, though the bulk are from shipyards, railroads and carbuilders, etc.

The Fred M. Prescott Steam Pump Co., Milwaukee, Wis., reports the following among its recent shipments of pumping machinery: Vertical steam condenser with a capacity of 60,000 lb. of steam per hour; triple expansion circulating pump with a capacity of 4,500 gallons per minute; compound circulating pump with a capacity of 1,200 gallons per minute, triple expansion pumping engine with a capacity of 1,000 gallons against 1,200 ft. head, and three large sinking pumps to the Calumet and Arizona Mining Co., Bisbee, Arizona. A triple expansion high service pumping engine to the Bisbee Baco Water Co., Bisbee, Arizona. Numerous medium sized mine pumping engines to the Missabe Iron Range, in Minnesota. Among recent orders booked are the following: triple expansion mine pumping engine with a capacity of 1,000 gallons per minute against a head of 1,250 ft. to the Junction Development Co., Bisbee, Arizona. A triple expansion and a simple duplex water works pump engines to the city of Eveleth, Minn. Five large compound and condensing pumping engines to the Tennessee Coal, Iron & R. R. Co., Birmingham, Ala., ranging in capacity from 1,500 gallons per minute against a head of 500 ft. to 2,500 gallons per minute against a head of 175 ft. A high service simple duplex pot form pump to the Tribune Building of Chicago, Ill.

Dean Bros. Steam Pump Works, Indianapolis, Ind., are engaged in filling the following pump contracts: one vertical pumping engine for The Central Illinois Con-

struction Co., with 40 in. double acting pump cylinder, two large vertical pumps for Johannesburg, South Africa, condensers and pumps for power station of the Toledo & Indiana Interurban R. R., sets of condensers and pumps for three steam cotton mills in the South.

S. Freeman & Sons Mfg. Co., Racine, Wis., advises us that it has entered more orders for boilers in the last month than in any two months since last May. Some of the more important of the contracts are the following: Warner Sugar Refining Co., Waukegan, Ill., three oil storage tanks 15 ft. diameter, 30 ft. high; Weyher & Son, Whitewater, Wis., 1 70-horsepower horizontal tubular boiler; city of La Salle, Ill., 1 150-horsepower internally fired boilers; Majestic Theater, Chicago, 3 250-horsepower internally fired boilers; American Distilling Co., Pekin, Ill., 2 265-horsepower internally fired boilers; Allis-Chalmers Co., Milwaukee, 1 150-horsepower internally fired boiler, Westboro Lumber Co., Westboro, Wis., 1 70-horsepower horizontal tubular boiler; Chapin & Gore, Chicago, 2 150-horsepower internally fired boilers.

Featherstone Foundry & Machine Co., Chicago, has just completed two dredgers for the United States government for use on the Columbia river. It has several inquiries in hand for large dredges for use in this section of the country, as well as for a number of smaller dredges for the reclaiming of swamp lands and the digging of irrigation ditches.

Gardner Governor Co., Quincy, Ill., write us regarding trade prospects as follows: "We are looking at the future through very optimistic glasses. Our business is very good indeed. We have had a large number of orders and an especially good lot of inquiries in the last four weeks. Without looking it up to verify, we should say that our business for this season is as good as at any time for a corresponding period in our history. Everybody seems to feel confident. All of our trade write that they expect great things for the coming year and with this feeling pervading the minds of the buyers, it is but natural to expect a substantial realization. Our orders are not marked in being from any particular locality; they are widely spread and come from all sections. All of our agents are asking us to give them greater stocks than ever, as they seem to think good times are ahead and they want to anticipate the demand so as to be in possession of a supply when it comes with the expected rush. Our impression as gathered from our experience is that the tone of business is good; it looks as though we were going to have a continuation of the prosperous period that has been ours during the last few years.

Pittsburg Old Material Market in 1904.

All forms of old material went begging during the summer months at ridiculously low prices. The dealers in this vicinity stocked up their yards to the limit, and all of them have been clearing big profits. A few of the large consumers stocked up, but most of the large interests have been compelled to come into the market during the past few months and pay the asking prices of the dealers. Melting stock offered here last summer was refused at $10.50, and at the close of the year is scarce at $17. Advances in other grades of material were in the same proportion. New melting stock continues to become scarcer every year as the large producers of this material are utilizing all they make in their own departments. The growth of the open-hearth industry will result in increased demands for old material, and while some plants can use almost any grade of stock, good heavy material will show the greatest growth in demand.

The Allegheny plant of the Pressed Steel Car Co., Pittsburg, resumed operations this week after a shut down of nearly a year.

Iron Trade Chronology for 1904.

January.

1. Price of merchant pipe reduced two points.

American Sheet Steel Co. and the American Tin Plate Co. consolidated under name of American Sheet & Tin Plate Co., with offices at Pittsburg instead of New York.

Reduction of 10 percent in wages of sheet workers of the Amalgamated Association.

4. W. G. Park and H. C. McEldowney appointed receivers of the Clairton Steel Co., of Pittsburg.

5. Steel Corporation passed common stock dividend.

7. Iron and steel cut nails reduced 10 cents a keg.

11. All wire products advanced $1 a ton, making plain wire $1.75 and wire nails $1.85 in carloads to jobbers.

12. Merchant steel bar association met in Pittsburg and voted down a proposed advance of $1 a ton.

25. Tin plate reduced 15 cents a box from $3.60 to $3.45. Last preceding change was made Nov. 16, 1903.

29. Independent sheet manufacturers advanced black and galvanizing sheets $2 a ton.

February.

1. Iron and steel merchant pipe advanced one point, except sizes 7 to 12 inches.

4 and 5. Meeting of Lake Superior iron ore producers held in Cleveland and majority favored reducing season's output to 13,000,000 or 14,000,000 tons.

9. Merchant Steel Bar Association met in Pittsburg and again reaffirmed prices.

27. United States Steel Corporation purchased 65,000 tons of Bessemer iron for March delivery from merchant furnaces at $13.85 Pittsburg. This was about 25 cents above the market. Options expiring March 10 and April 10 were taken on 110,000 tons at the same price.

March.

1. Merchant steel pipe advanced one point.

Another meeting of Lake Superior ore producers held in Cleveland but no agreement reached.

5. Wire products advanced $1, making wire nails $1.90 to jobbers in carload lots.

10. United States Steel Corporation exercised option on 65,000 tons of Bessemer iron for April delivery making total purchase up to date 130,000 tons.

10. Cotton tie manufacturers met and fixed a price of 75 cents a bundle on 5,000 bundle lots and over and 80 cents on less than 5,000 bundles.

14. Merchant Steel Bar Association at a meeting in Pittsburg advanced Bessemer bars $1 or to 1.35c, but made no change in open hearth bars.

15. American Sheet & Tin Plate Co. made formal demand on Amalgamated Association to stop scale evasions in independent sheet and tin plate mills, or, if this was impossible, to make a reduction of 20 percent in the tin plate scale and of 10 percent in the sheet scale.

21. Reductions in sheet and tin plate wages as demanded by the American Sheet & Tin Plate Co. went into effect by authority of the executive board of the Amalgamated Association extending to April 2, when ratification by sublodges was expected.

28. An injunction was granted the property holders of the Oakland district, Pittsburg, in the ore dust nuisance suit against the Jones & Laughlin Steel Co.

April.

1. United States Steel Corporation had 92 percent of its blast furnace capacity in operation.

2. General executive board of Amalgamated Association found referendum vote on sheet and tin plate wage reduction failed to ratify it and decided to hold special convention.

7. Structural and plate associations met in New York and prices were reaffirmed.

8. Sheet and tin plate workers of the Amalgamated Association met in special convention at Pittsburg to consider demands of American Sheet & Tin Plate Co. for wage reduction.

14. Sheet and tin plate wage matter settled by compromise on 18 percent on tin plate and an additional 8 percent on sheets, being 2 percent less than the original demand.

15. Meeting of the merchant furnace interests of Ohio held for the purpose of forming an association.

19-20. Meeting of Lake Superior iron ore producers held in New York. No agreement reached and the ore market declared open.

19. Papers signed for absorption of Clairton Steel Co., of Pittsburg, by the United States Steel Corporation, the latter guaranteeing the bonds and giving the Crucible Steel Co. of America $1,000,000 of its own second mortgage bonds. Both parties made official announcement on April 29.

22. Charcoal furnace operators at meeting in Detroit decided to restrict production one-third the remainder of the year.

May.

3. Merchant ore interests met in Cleveland but failed to reach an agreement among themselves on season ore prices.

Annual convention of the Amalgamated Association opened in Cleveland.

4. Meeting in Cleveland of Ohio producers of foundry pig iron organized a statistical association.

13. Pittsburg Stock Exchange formally adopted rules for pig iron warrant trading.

21. Amalgamated Association annual convention at Cleveland adjourned giving conference committees discretionary power, but urging continuation of previous iron scale, the elimination of all but 10 percent reductions in sheet and tin plate wages and total abrogation of all tin plate rebate arrangements.

Legal transfer of the Clairton Steel Co., Pittsburg, made to the United States Steel Corporation.

June.

1. Merchant steel pipe, 6-in. and under, reduced one point.

2. At a meeting of the hoop and band association hoops were advanced $3 a ton.

6. A reduction of $2 per ton was announced on black and galvanized sheets. The official action was merely in recognition of the existing conditions.

14. Bar iron conference between the Republic Iron & Steel Co., and the Amalgamated Association of Iron & Steel Workers, adjourned after an eight-day session. Association refused to accept $4.50 puddling rate on 1 cent card.

18. Conference between the Carnegie Steel Co. and the Amalgamated Association relative to new scale for American Steel Hoop department closed without settlement.

July.

1. New official prices on merchant steel pipe, making reductions ranging from one to 3½ points.

6. At a meeting of the billet association held in New York prevailing prices reaffirmed.

7. Structural and plate associations reaffirmed prices.

23. Sheet and tin plate scales finally adjusted and signed by the American Sheet & Tin Plate Co. Wage reduction on rebate plates changed from 25 to 12½ percent.

26. Tin plate reduced to $3.30 a box and discount increased from 1 to 2 percent.

30. Conversion deal made between the Pittsburg Steel Co. and the Republic Iron & Steel Co., by which the former furnishes 110,000 tons of Bessemer iron and the latter furnishes the same tonnage of billets for delivery during a period of 11 months at a conversion price of about $6 a ton, making the delivered price about $19.25. Pig iron was purchased at $12 at the furnace. The delivered price on the billets is about $19.25 or $3.75 below the official price of billets at that time.

August.

4. Meeting of all wire interests held in Chicago for the purpose of steadying the market. It was agreed to confine concessions from the official price of wire nails which were $1.90 a keg to $2 a ton.

15. Hoop mill of American Steel Hoop Co., Youngstown, O., placed in operation, no scale being signed. Amalgamated Association declared strike on at all mills of this department of the Carnegie Steel Co.

17. American Steel & Wire Co. announced reductions as follows: $4 on wire nails; $5 on plain wire; $7 on barb wire; new price—on wire nails $1.60, plain wire $1.45 and galvanized barb wire $2.05.

September.

3. Merchant steel pipe reduced from ½ to 5 points, according to size, averaging about 2 points.

6. Meeting of plate association held in New York, and owing to shading on narrow plates, official prices reduced $4 per ton on widths over 24 in. and $6 on 24 in. and under, to 1.30c for 24 in. and under and 1.40c for wider plates.

Structural shapes reduced $4 ton at meeting of association in New York, making beams and channels 15 in. and under 1.40c.

10. Republic Iron & Steel Co. reached an agreement with the Amalgamated Association and scale was signed for the scale year. All of the idle mills of this company resumed operations almost immediately.

19. Billets and sheet bars reduced to $19.50 for billets and $21.50 for sheet bars, f. o. b. Pittsburg.

Merchant steel bars reduced $1 ton to 1.30c for Bessemer and 1.35c for open-hearth.

October.

19. Iron and steel merchant pipe advanced one point.

22. Bessemer Furnace Association at meeting in Cleveland fixed price for Bessemer, 1905 delivery, at $13 furnace.

November.

1. Iron and steel merchant pipe advanced 1 point.

15. Steel advanced $1.50 ton, to $21 for billets and $23 for sheet bars.

Boiler tubes advanced 2 points.

Tin plate advanced 15 cents to $3.45 a box.

Black sheets advanced $2 to $2.20 for 28 gauge, and galvanized sheet $3 to $3.25 for 28 gauge.

16. All wire products advanced $2 per ton, making nails $1.70.

December.

8. Wire products advanced $1 per ton, making plain wire $1.60, wire nails $1.75 and galvanized barb wire $2.20.

Galvanized sheets advanced $2 to 3.35c for 28 gauge. Corrugated roofing advanced 5 cents per square.

10. Steel rail prices fixed at $28 for 1905.

19. At meeting of billet association, official prices on sheet bars and billets reaffirmed. Prices merely nominal, as premiums were being paid.

Structural shapes advanced $2 per ton, to 1.50c for beams and channels 15 in. and under.

20. Merchant steel bars advanced $2 on Bessemer and $1 on open-hearth, making both 1.40c, f. o. b. Pittsburg.

22. Black sheets advanced $2 or to 2.30c for gauge.

Corrugated roofing advanced 5 cents per square on painted and 10 cents per square on galvanized.

Tin plate advanced 10 cents to $3.50 net.

PERSONAL.

John R. Russel, of the Russel Wheel & Foundry Co., Detroit, has the sympathy of a wide circle of friends in the loss that came to him last week. In an elevator accident on Dec. 30 Mrs. Russel was fatally injured and death resulted soon after her removal to the hospital. The funeral was held on Monday, Jan. 2.

A. K. Krum, for many years connected with Naylor & Co., of New York, and who during the past three years has been associated with the company's Pittsburg branch, has resigned and will be connected hereafter with the Standard Iron & Steel Co., New England Building, Cleveland.

Edward Moore, for several years connected with the Ohio plant of the Carnegie Steel Co., Youngstown, O., has been appointed assistant superintendent of the upper plant of the American Steel Hoop Co., Youngstown, O.

S. B. Patterson has been appointed general superintendent of the Robesonia Iron Co., Robesonia, Pa., to succeed S. H. Chauvenet, resigned.

George W. Todd, who had for some time been manager of the Diamond State Steel Co.'s plant at Wilmington, Del., has resigned. The company is now in the hands of a receiver.

Henry B. Hunter has resigned his position as secretary and treasurer of the Shadbolt & Boyd Iron Co., Milwaukee, Wis. He had been connected with the company for more than 40 years and had been an official for the greater part of that period.

Robert C. Appleby, who has been sales agent for the Solid Steel Casting Co., Chester, Pa., has resigned to become connected with the Philadelphia sales office of the Bethlehem Steel Co. His successor as sales agent of the Solid Steel Casting Co. is W. H. Worrilow.

John D. Gilchrist, formerly manager of the Mountain and Stephens mines of the Mesabi range, but for some years superintendent of mines for the Colorado Fuel & Iron Co., has been at Duluth and on the Mesabi range the past few days. At the Sunrise, Wyo., mine of the Colorado company A. H. Ahbe, formerly engineer at the Soudan mine, Vermillion range has been in charge until now. Mr. Ahbe has resigned and returns to Duluth, where he will probably be associated with O. D. Kinney in the conduct of mineral enterprises. Mr. Gilchrist states that the Sunrise mines are looking better than ever, and that improvements of a substantial nature, large shafts and steel headframes, are now going on. The ore bodies are showing up well with exploration.

E. S. Lea has resigned his position as sales manager for the DeLaval Steam Turbine Co. and has opened an office at 42 Broadway, New York, as consulting engineer. Mr. Lea, prior to his four years' connection with the De Laval company, had a wide experience in the designing and construction of power plants and water works and in the manufacture of general machinery. The recent striking development in the uses of the steam turbine and the centrifugal pump make the step Mr. Lea has taken a timely one, and he is probably the first to enter this important field as an independent consulting expert.

George K. Hosford, Cleveland representative of Rogers, Brown & Co., who was stricken with apoplexy last April, is much improved and will start Jan. 9 for Pasadena, Cal., to spend the remainder of the winter in the hope of fully recuperating.

Capt. W. W. Smith, marine superintendent of the Pittsburg Steamship Co. has been given six weeks' vacation and he has started on a trip to California at the expense of the company. Capt. Smith is accompanied on the trip by his wife.

J. A. Rathbone, for a number of years superintendent of the United States Heater Co., Detroit, has accepted a responsible position with the International Heater Co., Utica, N. Y., the change taking effect Jan. 1.

Chas. L. Parmele formerly with Creagar Agency, Bourse Bldg., Phila., is now with the Vandyck-Churchill Co.'s Philadelphia branch.

OBITUARY.

C. S. Bell, president of the C. S. Bell Co., Hillsboro, O., died Jan. 3 at his home in that city. In addition to his foundry business, Mr. Bell was president of the Merchants' National bank of Hillsboro and had other interests. He was president of the American Foundrymen's Association in 1898-1899, being elected at the Cincinnati convention in June, 1898, and presiding at the convention held in Pittsburg the following year. Mr. Bell was a progressive foundryman, always interested in the betterment of foundry practice and will be remembered as a familiar figure at the earlier conventions of the association in which he took so active a part.

Christian C. Hill, president of the Chicago Steel Ball Co., Chicago, died at his home in that city Dec. 24, after suffering a stroke of apoplexy while experimenting in his laboratory. He was working on a model for an automobile oiler when stricken, and died soon after being taken home. He was a native of Rockford, Ill., and was 57 years old.

Robert James Hubbard died at Cazenovia, N. Y., Dec. 18, aged 74 years. He was a director of the Rome Brass & Copper Co., the Rome Tube Works and the Rome Metal Co., all of Rome, N. Y.

Charles N. Welch, senior partner of the Milford Iron Co., Milford, Mass., and one of the prominent business men of that city, died Dec. 18, after a brief illness of pneumonia.

Gen. William Henry Powell died at his home in Belleville, Ill., Dec. 26. He was born in South Wales in 1825, and came to the United States in 1830, locating at Nashville, Tenn., and removing to Wheeling W. Va., in 1843. He erected the Virginia Iron & Nail Works at Benwood, Va. in 1852, and was general manager of nail mill plants at Ironton, O. and Mason, W. Va., from 1853 to 1861. Subsequently he was with the Belleville Nail Works and the Western Nail Works. He entered the Union army in 1861 and had an honorable and distinguished record. President McKinley appointed him internal revenue collector for the 13th Illinois district in 1898, which position he held at the time of his death.

Abner Doble died Thursday, Dec. 22, at San Francisco, aged 75 years. Mr. Doble was a native of Indiana and went to San Francisco 55 years ago. He left New York in the fall of 1849 and sailed around the Horn, landing in San Francisco in June, 1850. He engaged in the blacksmith and wagon making business and the industry grew until in 1888 the Abner Doble Co. was incorporated, with Mr. Doble as president. About eight years ago, he retired from active business and his son, William A. Doble, is now president of the company.

John Garry, founder of the Garry Iron & Steel Co., Cleveland, died suddenly Dec. 17 at his home in Plainfield, N. J. Mr. Garry left Cleveland about 25 years ago.

Chas. Patterson, for many years a foundryman in Cleveland, died at his home in that city Jan. 3. Mr. Patterson was born in Ireland 66 years ago and came with his parents to this country when six years old. He started in the foundry business as a molder. Some 20 years ago he founded the Patterson Foundry Co., which had two plants, one of which afterwards became the City Foundry, while the other was taken over by the Blakeslee Foundry Co. Mr. Patterson retired from business four years ago and has since devoted the principal part of his time to travel.

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DRAWBACK TIN PLATE.

The statistics of the "drawback" operations on re-exported material in the fiscal year ended June 30, 1904, are now available, and show that the quantity of tin plate on which drawback was allowed was the smallest since 1888, being only 111,658,352 pounds. This compares with an average of about 125,000,000 pounds in the preceding five years, while in earlier years the quantity was, in general, considerably larger.

The decrease is undoubtedly due to the operation of a policy adopted some time ago by the leading tin plate interest, whereby it pays a rebate to certain customers on the exportation of cans, etc., made from its tin plate, which rebate is accepted in lieu of the drawback which the government would pay had imported duty-paid tin plate been used. The amount of rebate is adjusted so as to put domestic tin plate, on which the current market price has been paid, on a parity with foreign tin plate. Since the early part of 1895 the current market price of domestic tin plate has invariably been below that of imported tin plate, whether under the Wilson-Gorman tariff of 1.2 cents a pound, or the Dingley tariff of 1.5 cents a pound, which replaced it in the summer of 1897. Likewise, it has invariably been above the cost of drawback tin plate, which is practically duty free, save for the 1 percent retained by the government. The amount of rebate which would be required, from the current domestic market, to create a parity has neverthless varied rather widely from time to time. In general it may be said that lately tin plate imported under the drawback arrangement has cost, delivered New York, a trifle under $3 per box of I. C. cokes. The lowest domestic market for years has been $3.40, net, for I. C., f. o. b. Pittsburg, and in general the freight from Pittsburg averages much more than the freight from New York, the latter being merely part of a through rate. The amount of allowance to capture drawback trade is therefore considerable. The wage concession by the Amalgamated Association, amounting to 25 percent of the tonnage wages, averages between 10 and 12 cents per box, and a much larger concession of profits on the crude steel and the finishing operations is required by the United States Steel Corporation, but it has reasons of its own for making the necessary sacrifice.

From November 1, 1902, when the wage arrangement became effective, to June 30, 1904, the concession by the men was sufficient to cover about a million boxes of tin plate, or say 100,000,000 pounds. This amount of business was probably done, and the amount of drawback operations by the government correspondingly reduced. The following table shows the decrease which has occurred, and represents the operations of the drawback provision from the time it was first instituted. The figures refer to the number of pounds of tin plate on which the government allowed drawback in each fiscal year, and it should be noted that the drawback is allowed, not on the quantity of tin plate actually exported in the form of tin cans, lined cases, carpet sweepers, etc., but on the amount, allowing a minimum of waste, which would be required in the manufacture of the exported articles.

Pounds of Tin Plate on which Drawback was Allowed.

Year ended June 30,		Year ended June 30,	
1884	97,415,089	1895	126,777,800
1885	127,125,903	1896	137,659,779
1886	136,539,316	1897	139,246,130
1887	123,203,627	1898	137,897,570
1888	108,271,542	1899	122,906,682
1889	166,087,740	1900	125,269,156
1890	150,112,007	1901	127,261,883
1891	149,599,649	1902	125,340,511
1892	119,928,083	1903	123,088,272
1893	128,863,227	1904	111,658,352
1894	161,758,361		

Despite the fact that from the early part of 1895 the current market for domestic tin plate has steadily ruled lower than the current market for imported tin plate, it was not until the fiscal year 1898 that the imports of foreign tin plate for actual domestic consumption fell to really small proportions. From that year on the imports of tin plate have done little more than supply the drawback trade, as the following table will show. It is based not upon general imports, but upon imports for consumption and withdrawals from warehouse, and therefore more closely represents the movement.

Fiscal Year ended June 30,	Excess Imports over Drawback. Pounds.	Excess Drawback over Imports. Pounds.
1898	34,013,656	
1899		11,792,801
1900	17,329,441	
1901		6,800,739
1902	74,511,879	
1903		13,878,001
1904	15,300,304	
	141,155,280	32,471,541
Seven years' imports for domestic consumption		108,683,739
Annual average		15,526,248

There has been of late some expression of a hope in certain quarters that the drawback arrangement as applies to tin plate would be abrogated, but this

may be simply a strategic move against the proposition to reduce the tariff generally. On the other hand, Secretary of the Treasury Shaw has recommended that the operations of the general drawback arrangebe extended. He points out the curious anomaly that while tin plate can be imported and made into cans, and drawback paid on the export of the cans, it is impossible to import completed tin cans and fill them with food stuffs or what not, and collect any drawback on the exportation, although it would appear that the filling of a can with a manufactured article is as much a manufacturing operation as the making of a can.

RAIL EXPORTS DECREASED.

Although the exports of steel rails decreased from 69,380 tons in October to 53,723 in November, there were 26,904 tons shipped to British North America in the latter month, and the total is larger than might have been expected, in view of the fact that the new Canadian tariff became effective Nov. 1. The exports of steel rails to our Northern customers were 215,826 tons for the eleven months ending with November. The exports of billets, ingots and blooms increased from 12,989 tons in October to 20,547 in November. Pig iron decreased from 6,926 to 2,530 and scrap from 2,568 tons to 642. Wire rods increased from 474 tons to 3,528. The total exports on which tonnage is reported is 121,705 tons for the month of November, against 128,663 in October and 31,165 in November of 1903. The detailed exports of which tonnage is reported were:

EXPORTS OF IRON AND STEEL FROM THE UNITED STATES—GROSS TONS.

	November		11 mos. end'g Nov.	
	1903	1904	1903	1904
Pig iron	1,777	2,530	15,311	45,884
Scrap	898	642	5,289	25,411
Bar iron	2,083	2,398	19,019	27,286
Wire rods	818	3,528	21,344	18,045
Steel bars	578	1,742	15,080	23,344
Billets, ingots and blooms	296	20,547	1,380	296,162
Hoop, band or scroll iron	320	395	1,941	2,998
Iron rails	4	15	147	1,402
Steel rails	5,140	53,723	23,130	395,799
Iron sheets and plates	131	356	4,632	4,254
Steel sheets and plates	1,611	8,882	11,738	46,994
Tin plates, terne plates and taggers' tin	33	975	203	7,358
Structural material	2,614	6,267	27,707	49,778
Wire	10,355	14,170	98,560	108,406
Cut nails	473	538	8,195	8,616
Wire nails	3,905	4,710	29,514	28,418
Other nails, including tacks	129	287	2,062	2,696
Total	31,165	121,705	354,252	1,092,861

The exports of ore were 32,003 tons in November, against 6,994 in November, 1903, and 203,395 tons for the eleven months against 80,441 for the eleven months ending in November, 1903. The value of exports, excluding ore, but including machinery and other items of which tonnage is not returned, was $12,831,980 for November, 1904, against $7,985,961 for November, 1903. For the eleven months the totals were: $118,182,998 in 1904 and $89,682,747 in 1903.

Imports, when considered in comparison with the tremendous home production, are insignificant. They declined from 20,531 tons in October to 13,848 tons in November, compared with 45,394 tons in November, 1903. The imports in detail were:

IMPORTS OF IRON AND STEEL TO THE UNITED STATES—GROSS TONS.

	November		11 mos. ending Nov.	
	1903	1904	1903	1904
Pig iron	18,765	5,391	584,855	73,685
Scrap	2,457	628	80,396	12,434
Bar iron	2,452	1,600	39,284	18,800
Iron and steel rails	3,396	.....	93,488	37,444
Hoop, band or scroll	32	2	1,519	1,945
Steel ingots, slabs, billets or bars	6,580	992	260,133	10,270
Sheets and plates	2,917	233	10,877	4,008
Tin and terne plates	4,711	3,879	44,859	64,945
Wire rods	1,977	1,000	19,012	14,082
Wire and wire articles	286	275	4,539	3,646
Structural shapes	1,722	88	6,982	6,982
Total	45,394	13,848	1,145,944	248,221

The total value of imports of iron and steel, excluding ore, but including articles in which tonnage is not reported, was $1,542,883 in November, against $2,312,233 in November, 1903. The values for the eleven months were: $19,946,080 in 1904 and $39,516,378 in 1903. Iron ore imports were 72,329 tons last November, against 58,206 tons in November, 1903. For the eleven months the ore imports were: 421,264 tons in 1904 and 955,236 tons in 1903.

Greater Steel Capacity at South Sharon.

(Special Telegram.)

PITTSBURG, Jan. 4.—It has been decided to increase the number of finishing stands in the continuous sheet mill at South Sharon from eight to ten. Two additional furnaces in the finishing department are also to be installed. The continuous mill will finish sheets of No. 22 gauge and heavier without hand rolling on finishing mills, while the lighter gauges will require hand rolling. The mill will be placed in operation in April.

Entire Output of Basic Rails Sold.

The Tennessee Coal, Iron & R. R. Co. recently received an inquiry from the Mexican Central Railway Co., Ltd., for 5,000 tons of rails. As the company was not in a position to make the deliveries called for, it did not quote. Its entire estimated output of rails for the year 1905 has been sold.

The Kokomo Steel & Wire Co., Kokomo, Ind., which was organized three years ago with a capital of $1,000,000, has declared its first dividend, one and one-half percent quarterly. Its plant consists of a rod mill and two wire mills.

The Wedge Hoisting & Conveying Machinery Co., 305 Cuyahoga building, Cleveland, recently incorporated, will probably lease some suitable building for manufacturing. It expects to buy some shears, lathes and other iron working machinery. A great deal of the heavy work will be contracted for and assembled for the present. Its hoisting and conveying machine is especially designed for sewer building and ore and coal carrying at mines and docks. The company has several contracts and believes that it will find a ready market for its product.

The Clowes Brass & Copper Co., Brass City, Pa., has purchased the plant of the Shelby Seamless Steel Tube Co., Toledo, and contemplates removing all the machinery to Ellwood, Pa. The Toledo Chamber of Commerce will endeavor to have the Pennsylvania company use the Toledo plant and not move the machinery.

The employes of the Howard Axle Works of the Carnegie Steel Co., Pittsburg, have had their wages reduced from 5 to 16 percent. The reduction became effective the first of the year.

The Labor Situation.

STRIKERS SENT TO JAIL.

At Indianapolis, Dec. 29, in the federal court, Judge Anderson sent fourteen strikers at the Macbeth Lamp Works at Elwood, Ind., to jail with heavy sentences for contempt of court. In so doing Judge Anderson took occasion to announce to laboring men in Indiana what the attitude of the federal court hereafter will be toward labor agitators. He said, in part: "Labor, of course, has the right to organize as has capital. Any violation of the law on the part of corporations brought to the attention of this court will be justly dealt with, and violence on the part of labor unions will likewise be justly dealt with. Laboring men in the jurisdiction of this court, however, will understand that when an injunction is issued ordering men not to interfere with other men who have replaced them at their work, the word of this court is to be taken for what it says. You all say you place unionism above everything. You do wrong. Loyalty to your country is first and if you don't voluntarily put it first there will be courts that will see that you do."

METAL TRADES ASSOCIATION NOTES.

The records of the Chicago Metal Trades Association Labor Bureau for the week ending Dec. 29 indicate that the supply of machinists in that city is in excess of the demand. The executive committee of the association is advising members to avail themselves of the facilities of the Labor Bureau as far as possible.

A meeting of the Boston Metal Trades Association was held at the Trade Club on Dec. 28. W. P. Eagan was present and made an interesting and effective address. George H. Ellis, president of the United Typothetae, spoke on the local printers' strike which occurred in the spring of 1904 and of which a complete account was printed in the September edition of the National Metal Trades Association *Bulletin*.

The records of the Boston Labor Bureau for the week ending Dec. 28 indicate that the supply of labor is in excess of the demand.

W. C. Gentry, secretary of the Manufacturers Association of Pittsburg advises that the labor conditions are in better shape than have been the case in many days.

The situation in the shops of the members of the St. Louis Metal Trades Association is quiet except in a few instances where efforts are being made by union agitators to unionize the shops. In the foundries affected by the strike of the molders in that city there is no change. The foundries are running with a full quota of men.

W. P. Eagan, commissioner of the N. M. T. A., who was spending the holidays in the East in the interest of the association was called home by a telegram notifying him that his mother had suffered a stroke of paralysis.

The affairs of the N. M. T. A. according to the records of Secretary Wuest are in better condition today than ever. This is taken as an indication that leaders of the various labor organizations with which members of the N. M. T. A. come in contact are beginning to realize that it is not wise for them to create trouble in the shops of members.

The executive committee of the Cincinnati Metal Trades Association has decided on Feb. 9 as the date for the next quarterly meeting. A dinner will precede the meeting, which will be held at the Business Men's Club. It would seem from the number of technical papers which are being prepared by the superintendents and foremen in Cincinati shops, that there will a number of well attended foremen's meetings during the year. These meetings have been of benefit, both to the men themselves and to their employers. The probabilities are, now that the foremen and superintendents of the Chicago Metal Trades Association have fallen in line, that there will be a general formation of clubs of this kind:

LABOR NOTES.

At a meeting of the conference board of the National Founders' Association and the Molders' Union of Racine, Wis., to consider the differences between the union and E. W. Walker & Co., the foundry contractors of the J. I. Case Threshing Machine Co., of Racine, it was unanimously decided to remove all restrictions as to output of the men, but to leave all other matters to be settled directly by the men and their employers.

"Billy" Radcliffe, of Youngstown, O., who has become well known throughout Ohio on account of his identification with various reform movements, has declared in favor of the open shop. At a recent meeting of the Reform Club of Youngstown he said: "I believe in the open shop, the widest kind of an open shop—because I believe in high wages, because I believe in liberty that makes high wages possible, and believing in liberty for myself I must believe in liberty for all, equal liberty, equal freedom, equal rights to all, special privileges to none."

Eastern Pennsylvania.

HARRISBURG, Pa., Jan. 3.—Pessimism has no place this year in the predictions of the iron and steel manufacturers of this part of the Keystone State. There have been many expressions of opinion within the last week and most of them are of the very cheerful sort. There seems to be considerable work on hand and, barring shortage of water, there is no reason why the first quarter should not be a good one. More furnaces will be started before Feb. 1. One significant fact is that comparatively few of the mills between the Alleghanies and Philadelphia suspended operations during Christmas week and that stoppages for New Year's day were unknown. The railroads are being pushed for cars and shipments are reported good.

The Sheridan furnaces at Sheridan, Lebanon county, have been sold by the Pennsylvania Furnace Co., which has held them for several years, to Robert Cochran, of Brooklyn, who will put them in operation. They have been idle since 1902.

The removal of the rolling mills of the Janson Iron Co. from Oxford, N. J., to Columbia on the Lower Susquehanna has been started. The officers of the company say that they will erect a fine new mill at Columbia.

Conditions about Reading are reported to be good. There are various improvements and extensions of mills rumored and it is said that plans are being drawn for some of them. The hardware works of the city have had a good yead and the Reading Hardware Co. declared a substantial dividend.

One of the striking conditions about Central Pennsylvania business is the great amount of railroad work. The Reading and Pennsylvania companies have their shops running full time on repairs and are sending locomotives which they are unable to repair immediately to various works for overhauling. Car shops are reported choked with work.

On Jan. 16 the Bethlehem Steel Co. will remove its Philadelphia office from 421 Chestnut street to the 15th floor of the Pennsylvania building, 15th and Chestnut streets. W. B. Kennedy is Philadelphia sales agent.

The furnace of the Struthers Furnace Co. at Struthers, O., last month had the largest output in the history of the stack, 9,828 tons, or 317 tons per day.

HOW TO START A FOREIGN TRADE.*

BY F. F. PRENTISS.

Considering the keenness, nerve and energy which the American business man shows in pushing his product at home, it is puzzling that he has not developed a larger and more general foreign trade. If statistics could be gathered, I have no doubt that the number of failures on the part of American business men to establish a foreign trade would be a revelation to the somewhat egotistical American commercial world. What has been the chief cause of these failures? And what is the proper course to pursue and the methods to use in starting a foreign trade?

The American business man will not go to the heavy expense, the long labor and hard struggle necessary to get a real foothold in a foreign country. An analysis of the situation will show that he has some justifiable reasons for this attitude, but the majority are without foundation.

That comparatively new and flourishing branch of business enterprise—advertising—is a product and instrument of the western world. Advertising has come to be the strongest arm of the American manufacturer's sales organization. He still has his salesmen; he needs his display rooms; he must make personal visits. But advertising, even though it does not close up the deal on a sale, at least prepares the way—it blazes the path for the salesman; it serves as his letter of introduction; it opens the door to him. At one point or another in the sale it reduces the physical effort and mental strain of selling. It is a comparatively cheap and unstrenuous way to develop a demand. His advertising having developed a demand, or at least a knowledge, he sends out his salesmen to the retailer to give the final pull necessary to land the orders—to transform this latent demand into tangible orders.

In Europe this course of procedure is well-nigh impossible. It can perhaps be worked in some cases and to some extent in England, but on the continent almost never. And the reason why is very simple: The consuming public—the housewife who buys the breakfast food, the office worker who uses the typewriter, the factory foreman who wants the tools, the young dandy who wears the coat—these people do not read periodicals as do all classes here. The consumer cannot be reached through general advertising mediums. The soil is not ready to receive this kind of seed and grow a harvest from it.

This very simple train of thought the American business man apparently has rarely followed out. As a rule he begins his campaign for foreign trade with advertising. He gets no results. He jumps to the conclusion that there is, therefore, no demand in the country for his goods.

Another common and equally fruitless method of starting a foreign trade is the plan of selling through the syndicate agents and salesmen. Such syndicate agents have the same weakness as general salesmen or jobbers in this country.

A serious mistake on the part of the American business man is that he does not realize the foreigner's attitude toward business, his commercial point of view. In Europe business is a vocation, not as in America, simply a means toward an end—the making of money. The Englishman, the German, is in business because he is thereby doing a service to the public, just as is the doctor or the government official, and he therefore deserves a certain reward for this service. It never enters the American manufactuer's head that he is manufacturing in order to help the world onward. He is doing it to make money, and as much as he can. If he is shrewd he gets his reward; if he is not, he fails to secure it no matter how much work he has done.

The European is thinking not so much of the profit, but rather of the work involved. He is conservative; he clings to old connections and goods. If he has bought from a certain jobber or manufacturer for many years, he will stay with him even at a slight money loss. This hold is strengthened by the fact that business is there more social, less commercial, than here. The buyer knows the selling house and the salesman; personally he is in the same class and social circle with them. When class and even caste lines are closely drawn, as they are in Europe, closer personal bonds between individuals in the same class result. He has an inherent dislike for competition; it is distasteful to his temperament; it disturbs personal and social bonds between him and his fellow townsmen; it appears to him to sacrifice some of the dignity of his position. The result is that the two most significant phases in American commercial life, lower price and better quality, do not attract the European buyer. Why does he want to put in new goods with a lower price or higher quality, and assume the risk of pushing new goods? He has his trade, who will stay with him anyway; he cannot get the other fellow's. Putting in a new line of goods means considerable inconvenience and extra work for the dealer—a thing to which he is unalterably opposed.

Not only does the American business man fail to grasp the attitude of foreign merchants, but he also fails to understand his customs and ways, his methods and terms. The consumer has the same characteristics, the same attitude toward business as the dealer. His point of view is widely different from that of the American consumer. He has not had the the same training, the experience in buying which will enable him to feel a desire and to form his judgment merely from a printed description of an article. Often he has not sufficient discrimination to be able to decide between two similar kinds of goods. He will cling to old goods and old merchants; he does not want a change.

The American concern contemplating the opening of foreign trade should send some responsible representative abroad to look over the ground; if he be one of the principals, so much the better. Second-hand reports in a case of this kind cannot be made forceful or give a comprehensive description of the situation adequate for mapping out a campaign. This representative should study the situation sufficiently to be able to judge of the possible markets, of the classes to which his products will go, in what centers its sale will be concentrated, how extensive it will become, and through whom the exigencies of the case will require him to sell. Understanding the situation, he can make intelligent plans to meet it. His first temptation will be to establish at once a foreign agency with a foreign firm.

There are three reasons which should absolutely forbid this. In the first place it is difficult to make a selection. He will probably receive many applications on handsome letter-heads, praying for the privilege of acting as his representative. These are usually worthless, and, more than worthless, even dishonest at times; they often come from houses whose object is to obtain goods and money under false pretenses. In the second place, on account of the patriotism and conservatism described above, he will find it hard to get able as well as honest men to act as agents. His goods are not known, their value has not been tried, there is no demand for them. Naturally such an agency is not an inviting proposition to the stable business man. Thus, in all probability the exporter will either get a poor agent or he will get poor terms. Either is singularly fatal, for in Europe a change in agencies is not such an easy kaleidoscopic operation as in this country. Agencies are serious, permanent things. In the third place, if an agency is established before any trade is built up, the agent will rarely go out after business; that is not the accepted European style of doing business. In other words, he cannot be relied upon to build a trade.

The last two reasons are strengthened by the fact that Europeans are brought up with the "exclusive agent" idea. There the manufacturer does not sell his line to other dealers in his city or territory. The jobber always wants the exclusive selling rights; and the bigger the territory, the better he likes

*Mr. Prentiss, of the Cleveland Twist Drill Co., has an article in *System* from which we take the accompanying extracts.

it and the prouder he is. The words "Exclusive Dealers For" in his advertisements and on his letter-heads seem to tickle his fancy and to flatter his business pride. The real reason for this custom probably is that it lessens competition, for the result of it is that only one man in a town or territory can be secured to carry goods. Usually long-time contracts must be made with him, and then if he does not push the goods the exporter has no recourse.

The best plan is for an exporting firm to send one or two of its best agents into the foreign territory to work directly upon the consumer. It is not good policy to use foreigners for this work; they know the language and local customs, but they will have the same faults as the dealers: conservatism, prejudice, slowness. To make a fair trial requires a good hustling American salesman. And the characteristics of the typical American solicitor will guarantee him to be sufficiently adaptable to grasp new business systems and methods very quickly. He carries American adaptability, enthusiasm and dash with him, and these are worth more than linguistic or local custom knowledge.

Suppose these two agents are sent to England first, one to London and one to Liverpool. The best plan is for them to take orders from the consumer or user in such a way that they can be held, that is, that they need not be filled at once. After they have worked a month or two, the salesman can go to the local firm in London which the house has by this time decided it wants as the English representative, and say: "See the orders we have secured here. We have convinced these people that we have better goods and better prices than they have been getting. We have created a demand. We know our goods will satisfy and that the demand will continue. Do you want to be our medium for supplying the demand?" By this plan you kill three birds at one throw. You get the agent you want, and at your own terms. You have convinced the consumer and started a demand on his part for the goods. You have taught the foreigner something about your methods of getting business.

When the agent, who will of course be the exclusive agent for London or the whole of England, is established, allow these salesmen to stay and work for him for a time. Such a course will bring him orders, and therefore get him into good humor, pleased and enthusiastic over the goods. And it will be a course of instruction in salesmanship to him, he will become informed concerning the article, its talking points, particular value and superiority, for he must be taught this as much as any beginning salesman. He will learn to go after business in the American way.

But all the learning is not on the side of the foreigner; the American business man on his part must learn how his customers want to do business, what special line of goods they want, how they want their orders filled and their goods shipped, and what kind of terms they desire. He must act accordingly.

There are, therefore, four steps in the opening of foreign trade:

Getting the lay of the land and a knowledge of the situation.

Creating a demand among consumers—best by personal solicitation, sometimes by advertising or other means.

Appointing agents and teaching them the goods and selling methods.

Learning to please the foreign customer and consumer.

Foreign commerce takes time to build; it grows slowly; it requires the expenditure of much money. The exporter needs knowledge, courage and persistence. Although I have been considering this subject apparently as concerns commerce with England and the European continent only, yet what I have said applies to trade in most staple lines in every part of the world. For the American manufacturer will find that, whether he is sending goods to China, South America or India, he is dealing with German or English merchants.

THE MESABI AND BARABOO RANGES IN 1904.

BY DWIGHT E. WOODBRIDGE.

Developments in the Lake Superior mining region for the past year have been chiefly confined to the Mesabi district and to the new region about Baraboo, Wis. It is but natural that the Mesabi should figure most prominently. Its area and tonnage exposed, the possibilities of new mines within its borders, and the overwhelmingly important proportion of all lake shipments that come from it combine to compel the most lively progress there. Baraboo has stepped into prominence from the fact that the first shipments of the district were made last year, and from the further fact that its limitations as a producer are fairly well defined.

By reason of the quiet in iron circles during most of the year, which had come down as a heritage from the close of 1903, Mesabi explorations have been less in 1904 than for some time. The 200 or more drills actively punching holes into the earth all along the range had been reduced to not more than 50, and many of these were working on proved lands, making ready for definite mine operations. Of ore that may be classed as strictly merchantable under present notions of what that term implies, new tonnage discovered during the year has not kept pace with shipments. This year is the first time that such a statement can be made. Probably with more drills, more activity in exploration, and more demand for ore than has manifested itself during most of the year, the tonnage brought into sight would be larger, but it is now the general consensus of opinion that the Mesabi is pretty well found; that new discoveries will be small and far between, and that new comers will be sadly disappointed if they look for large bodies of ore to be discovered by any one who sticks a drillhole into the ground. Strange as it appears to a man posted on the exact situation in the exploration field, many furnace managers of the East and Central West still adhere to the notion that almost anywhere in Northern Minnesota ore may be found. They argue from the sudden discovery of the Mesabi and its wonderful record that it is probable other fields may come in. On the Mesabi are more than 20,000 drill holes, stretching in unbroken succession from T 60 R 12 to the Mississippi river, and if they have left much ore unfound it will be most astonishing to those that have seen the skill, patience and the exact knowledge of local geological conditions with which these holes have been put down. The geological formation of the country surrounding the Mesabi does not lead to the conclusion that other districts than those now known are hid in the forests and swamps of Northern Minnesota.

If the work done the past year on the Western Mesabi, where are sandy ores that probably generally require washing and mechanical concentration, is given the consideration it deserves, the tonnage exposed during the year equals all that has been mined, not only this year, but since the first openings were made upon the range. It is not far from the facts to put the tonnage of these dry Western ores so far shown up at about 150,000,000 tons, much of which had been shown before 1904. If concentration reduces this 20 percent there remains a large amount of ore that will work well in the furnace, and will be free from some of the objections that have been raised to the use of large percentages of Mesabis. This Western Mesabi work is important in the bearing it may have on the future development of new tonnage on the range. It is not probable that all the deposits between the east line of T 56 R 22 and the Mississippi River have been found; indeed it is reasonable to suppose that where work is comparatively so recent, with the exception of that done in a few scattered locations, as much or more remains to be opened than has been developed. It is very evident that much attention will be paid to this portion of the district in the immediate future.

As to Baraboo, which though not exactly in the Lake Superior region, yet is of it and must be considered in relation to it, the beginning of shipments was made in the summer of 1904. So far but one mine has been opened there, that of the International Harvester Co., called the Illinois, and this has forwarded to Chicago almost exactly 50,000 tons during the past six months. The Sauk mine, owned by interests associated with Rogers, Brown & Co., has been idle and is probably to remain so for some years. There are other explorations owned by W. G. LaRue and associates that are under examination by steel making concerns, and may become mines in due time. The Pittsburg Steel Co. has an elaborate force of explorers, engineers, etc., on the ground and is exploring with much vigor and to great depths. What it has found, if anything, is not public. The Baraboo district is a relatively small one, with disadvantages, though with correspondingly favorable conditions that are well worth serious consideration.

Baraboo district has its distinct place in the economy of the steel trade of the country, and that place seems to be pretty well settled by the operations of the past year or so. That it is any material assistance as a reserve of ore for iron makers in the East would seem not to be borne out by the facts. For them it cannot compete with the lean Bessemers of the Marquette, the easily mined low grades of the Menominee or with the Mesabi. But for furnaces on Lake Michigan the situation is different. Baraboo ore can reach their furnace stock piles at about the cost of hauling Mesabi ore to upper lake docks. Once at furnace yards it is ready for use. Mesabi ores on upper lake docks must pay from 75 cents to $1.50 to put them in a corresponding position at furnaces on Lake Erie or at Pittsburg. Baraboo ores would have the same or a greater charge to get them to the latter points and once there would represent a much greater investment per unit than Mesabi or a far higher actual charge than that against Marquette or Menominee lean ores at the same points. Baraboo is a narrow and constricted district Experience of the year has shown that pumping costs are extreme, running up at the Illinois to more than 35 cents a ton of ore hoisted. The lens is narrow and shades off into an ore so lean that its use is prohibited. But there is a good deal of ore there, doubtless. Underground operations at the Illinois show a main drift on the first level running in ore for more than 1,200 ft., and no indications that both breasts cannot continue to the limits of the company's ground. It would be hard to duplicate such a drift on the old ranges, except at a very few mines. The lens of shippable ore in which this drift is driven is not, however, more than 25 to 30 ft. wide. If one can figure by diamond drill holes on this property and adjoining land, holes that probably cut the same deposit and add to its strike and its pitch, the tonnage shown is important enough to be worth the most careful consideration.

Some work has been done the past year west of Duluth, along the Northern Pacific road, near Aitkin. Not enough has been shown to give any definite information as to the value of this region. One thing alone seems assured, that another iron bearing formation has been found. Whether it is good or poor, large or small, nobody can yet say.

The Mesabi will have to stand the brunt of this year's mining operations, whatever they may be, and if as large as 30,000,000 tons, or even 28,000,000, its mines will be pushed to vast activity. Its proportion of the whole will probably be greater than ever. There will be a number of new mines; the United States Steel Corporation alone will have four or five of them, all of considerable size, some very large. It will also be able to ship heavily from several properties that the past year were small belated producers. Several other producing companies are opening mines and adding stripped areas or more shafts. Among these are Pickands, Mather & Co., Jones & Laughlins, the LaBelle Iron Works and Corrigan, McKinney & Co. The big mines are all being developed for heavy production, and there is great activity all along the line. Railroads reaching the Mesabi are spending about $2,000,000 in additional equipment for ore and are overhauling their equipment for an early start and a long pull.

There is, on the Mesabi and Vermillion ranges, chiefly the former, including all mines on both ranges equipped with steam for any purpose, underground or open pit, a total of 48,000 h. p. now installed. A report made 18 months ago gave a total of 30,000 h. p.; the increase was during the first twelve months of the time since the initial report, for there has been little addition to equipment lately. That the steam power on these ore ranges was increased 60 percent in a year shows how great was the activity in new mines for that period. Stripping contractors on the Mesabi have 5,500 h. p. of steam shovels and attendant locomotives, with a total of 21 shovels. Mining companies on the same range have 24 shovels used mainly for stripping on their own account and 42 shovels for mining in open pits and loading from stockpiles. Many more have been ordered for spring delivery. There are five shovels in use on the Vermillion range, all for loading stocks. The leading mines, so far as power is concerned, are Mountain Iron, Fayal and Adams, with 2,400 to 2,100 h. p.

Within the past few weeks there has been more activity in the purchase of mining properties than for nearly two years. The United States Steel Corporation and Pickands, Mather & Co. are leading buyers, and the big company, with its overwhelming reserves, seems more active than any one else, and to realize the situation to the utmost. It has bought more than 30,000,000 tons of Mesabi ore in the ground within the past 90 days.

The year ends with wages readjusted and scaled in accordance with present conditions, and with miners doing as well as two years ago, with great activity and a high degree of prosperity and with the outlook rosy for a long period.

Business Methods as Applied to Labor.

I am asked if I believe in the adoption of this system of employing commissioners of labor where the employer deals with organized labor as well as where he deals with unorganized labor. It seems to me equally important that labor be under the eye of an expert and that the labor department be in charge of an expert, no matter whether that labor is organized or not. Indeed it is not only organized and unorganized labor with which the employer has to deal. Labor may properly be classified under three heads: organized labor, unorganized labor, and *disorganized labor*, and of these the last is the worst.

Under a system of referring all labor disputes to a special department, it will be seen, that by that very act a clearing house is established where all labor troubles may be wisely and equitaly adjusted.

Courage is all-important in war, but first of all and before war is declared, discipline in the army is essential. The general who does not enforce discipline or who is ignorant of the character and disposition of the men under his command, or of the men he is opposing, however courageous he may be, or however brave his men, is almost certain to be defeated. The same is true of the man in charge of the labor of any great plant or of any great industry. He must not only know the character and the disposition of the men employed, but he must know in advance of any conflict the exact nature of the grounds upon which that conflict is to be waged. Superintendent or a manager is often unable to decide these questions because of a previously formed, or even an expressed opinion, or because decisions have already been rendered by him which are in fact the issue upon which a strike has been declared.

Such issues therefore should be avoided, and they can be avoided by relieving the superintendent or manager from performing tasks that properly belong to a special department established for that well defined purpose.

Such are the difficulties that at the present time confront the superintendent or manager His position is not only difficult, but often thankless. Certainly he is often misunderstood I want to see his burden lightened—not increased. He needs some one to back him up when he is right and to point out the right way when he is wrong. I know how to sympathize with him, certainly when, as in the packing house industry of Chicago, for example, he is obliged to meet and hear the complaints and suggestions, so I am informed, of labor committees, stewards and business agents to the number of 128. If this be true, is it surprising that the best natured and the best qualified superintendent loses his patience? What else is to be expected under such a system? This system must be changed; it is intolerable, and it will be changed, we may be sure, just as soon as the employers themselves organize, and deal with the labor problem as it deserve to be dealt with by enlightened business men—in an enlightened, humane and businesslike manner.

At the risk of being tiresome, I want to repeat, that in every great industrial plant, there are many departments each with its carefully appointed head. The one exception is the department of labor. Where else is so much involved?

A watchman is employed to protect the machinery and all the other property of a great plant, while the necessary discipline for the proper direction and the wise management of the one great human asset is too often left to the mercy of mere chance.

It has been often urged that this is because of the intense selfishness of the employer. This charge I deny, but be this as it may, let the employer be ever so selfish and let him think only of his own direct interests; if he is only wisely selfish, and will see with a clear vision his own ultimate successes, he will do more for the advancement of labor, he will do more to prevent strikes and lockouts and to insure prosperity and harmony in the industrial world, than can possibly be done by an army of genuine reformers, or by the wisest philanthropists.

This should be self-evident, for upon the steady employment of the laborer at fair wages, working under proper labor conditions, does the laboring class depend for decent and adequate support, precisely as upon the excellence and amount of the work performed by the laborer does capital depend for its dividends. The sum of these two insures prosperity for the nation.

I could continue to talk almost indefinitely on this subject which in my opinion is so vitally important to the welfare of the nation, but I will conclude by earnestly insisting that the employer class has a solemn duty to perform and that upon it rests the responsibility for establishing a wise and equitable system of preventing or adjusting labor disputes. —[Herman Justi, Commissioner of Illinois Coal Operators' Association.

Wickes Bros., Pittsburg, have been awarded the contract for the erection of an addition to the open-hearth department of the Allegheny Steel & Iron Co., Avenue, Pa. The building will be 70 x 100 feet. The Allegheny Steel & Iron Co. proposed to erect an additional 35-ton furnace.

At a meeting of the directors of the Pennsylvania lines west of Pittsburg held in Philadelphia, last week, an expenditure of $3,380,000 was authorized for the purchase of 4,000 steel cars.

A large galvanizing and corrugated roofing plant is to be added to the Aetna-Standard sheet department of the American Sheet & Tin Plate Co., Bellaire, O. The building will be 70 x 520 feet and will have a weekly output of roofing material and galvanized sheets of 300 tons.

Iron Market Fluctuations in 1904.

The supplement accompanying this issue shows by a chart, as well as by tables of figures, the fluctuations in the prices of iron and steel products in the months of 1904 and the nine years preceding. The figures on which the chart is based are the averages of weekly prices given in the market reports of *The Iron Trade Review*. They are computed for the following: Bessemer pig iron at Pittsburg, Northern No. 2 foundry iron at Chicago, Southern gray forge iron at Cincinnati, Bessemer steel billets at Pittsburg, and for three forms of finished material—beams at Pittsburg, tank plates at Chicago and bar iron at Cleveland.

The vertical lines in the chart of price curves represent months and the horizontal lines the prices in dollars per net ton, in the case of finished material, and per gross ton in the case of pig iron and steel billets. The solid and broken lines traversing the diagram indicate the changes in monthly average prices, but naturally do not show the extreme high or the extreme low price that may have been reached in some week of the month. In platting the price curves for 1904 the pool prices are given for finished products so far as these prices were observed. Where concessions were made in fact, even though no change in official prices was made, the price as established by actual transactions is given.

The chart, covering a period of ten years, shows first the effervescence of the frothy little boom of 1895, following the dragging prices of the period of depression, then the sharp falling off in the latter part of 1895, followed by the slow general declines of 1896 and 1897, relieved by very slight hummocks of temporary recoveries. The real recovery came in the last quarter of 1898, and the steep upslant of the price lines tells the story of the boom of 1899, while the 1900 space has a graphic picture of the precipitate descent of 1900. The latter part of that year shows the climb renewed and 1902 gives a burst of prosperity, which, however, did not carry prices as high as in the uprush of 1899, though there were some exceptions. The decline in 1903 is familiar history, and its continuance in 1904 is shown in the downward movement of the lines. The 1904 space is noteworthy for the testimony it gives to the influence of the associations in finished materials, while the pig iron lines represent the improvement in March, April and May, the renewed declines in the summer and the advance from early October to the end of the year. The table of monthly averages from which the lines for 1904 were platted is as follows:

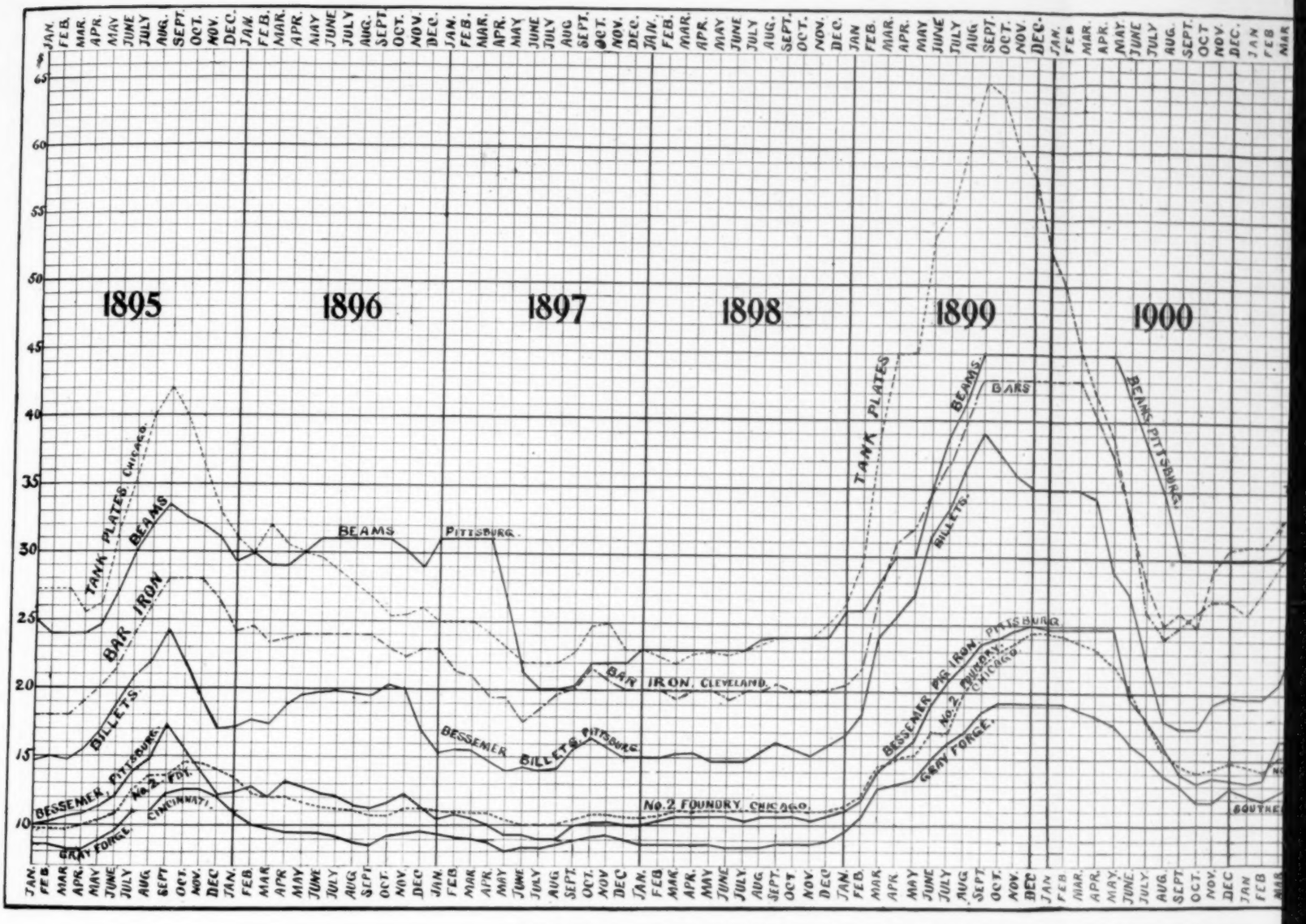
AVERAGE MONTHLY PRICES OF IRON AND STEEL PRODUCTS IN 1904

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug	Sept.	Oct.	Nov.	Dec.
No. 2 Fdy Chicago	$14.10	13.75	13.55	14.00	13.80	13.40	13.30	13.35	13.40	13.70	15.60	16.00
Gray Forge Cincinnati	$11.00	11.00	11.25	11.75	11.25	10.75	10.75	11.00	11.00	11.75	14.25	15.00
Tank Plates Chicago	$35.30	35.30	35.30	35.30	35.30	35.30	35.30	35.30	29.30	29.30	29.30	30.10
Billets Pittsburg	$23.00	23.00	23.00	23.00	22.00	21.50	21.00	20.00	19.50	19.50	21.00	21.00
Bessem'r Pig Pittsburg	$13.60	13.35	13.85	14.10	13.60	12.60	12.50	12.65	12.75	13.35	15.25	16.60
Beams Pittsburg	$32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	28.00	28.00	28.00	30.00
Bar Iron, Cleveland	$25.00	26.00	27.00	29.00	29.00	28.00	28.00	25.00	25.00	27.00	28.00	32.00

The Pennsylvania Railroad Co. has placed an order with the Baldwin Locomotive Works, Philadelphia, for 300 locomotives for delivery this year. Some time ago an order was placed with this plant for 25 locomotives and the order now totals 325. At the Juniata shops of the company, Altoona, Pa., 200 locomotives will be built during the year.

Greaves & Klusman rounded out a satisfactory year with a nice run of orders in hand on which to begin the new year.

CHART SHOWING FLUCTUATIONS IN IRON AND ST



AVERAGE MONTHLY PRICES OF IRON AND STEEL P

(FINISHED PRODUCTS IN NET TONS. PIG IRON AND BILLETS IN GROSS TONS.)

	1895											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
No. 2 Foundry Chicago	$ 9.75	9.75	9.75	10.00	10.25	10.75	12.50	13 50	13.50	14.50	14.50	14.00
Gray Forge Cincinnati	$ 8.50	8.50	8 25	8.25	8.75	9.50	11.00	11.00	12.25	12.50	12.50	12.00
Plates Chicago	$27.00	27.00	27.00	25.50	26.25	31.50	35.50	40.00	42.00	40.00	36.50	33.00
Billets (Bess.) Pittsburg	$14.85	15.00	14.85	15.40	16.75	18.75	20.85	22.00	24.25	22.00	19.50	17.00
Bessemer Pig Pittsburg	$10.00	10.15	10.25	10.75	11.25	12.00	14.00	14.75	17.25	15.75	14.00	12.25
Beams Pittsburg	$25.00	24.00	24.00	24.00	24.50	27.00	30.00	32.00	33.50	32.50	32.00	31.00
Bar Iron Cleveland	$18.00	18.00	18.00	19.00	20.00	21.50	24.00	26.00	28.00	28.00	28.00	26.50

	1896											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
No. 2 Foundry Chicago	$13.50	12.25	12.00	12.00	11.75	11.25	11.25	11.20	10.80	10.75	11.10	11.25
Gray Forge Cincinnati	$10.60	10.00	9.85	9.50	9.50	9.40	9.10	8.75	8.65	9.10	9.35	9.50
Plates Chicago	$31.00	30.00	32.00	30.50	30.00	29.75	28.60	27.75	26.75	25.40	25.50	26.00
Billets (Bess.) Pittsburg	$17.65	17.65	17.50	18.90	19.50	19.75	19.90	19.75	19.60	20.25	20.00	17.00
Bessemer Pig Pittsburg	$12.50	12.80	12.00	13.15	12.75	12.40	12.20	11.45	11.25	11.50	12.30	11.40
Beams Pittsburg	$29.20	30.00	29.00	29.00	30.00	31.00	31.00	31.00	31.00	31.00	30.25	29.00
Bar Iron Cleveland	$24.20	24.50	23.50	23.75	24.00	24.00	24.00	24.00	24.00	23.00	22.50	23.00

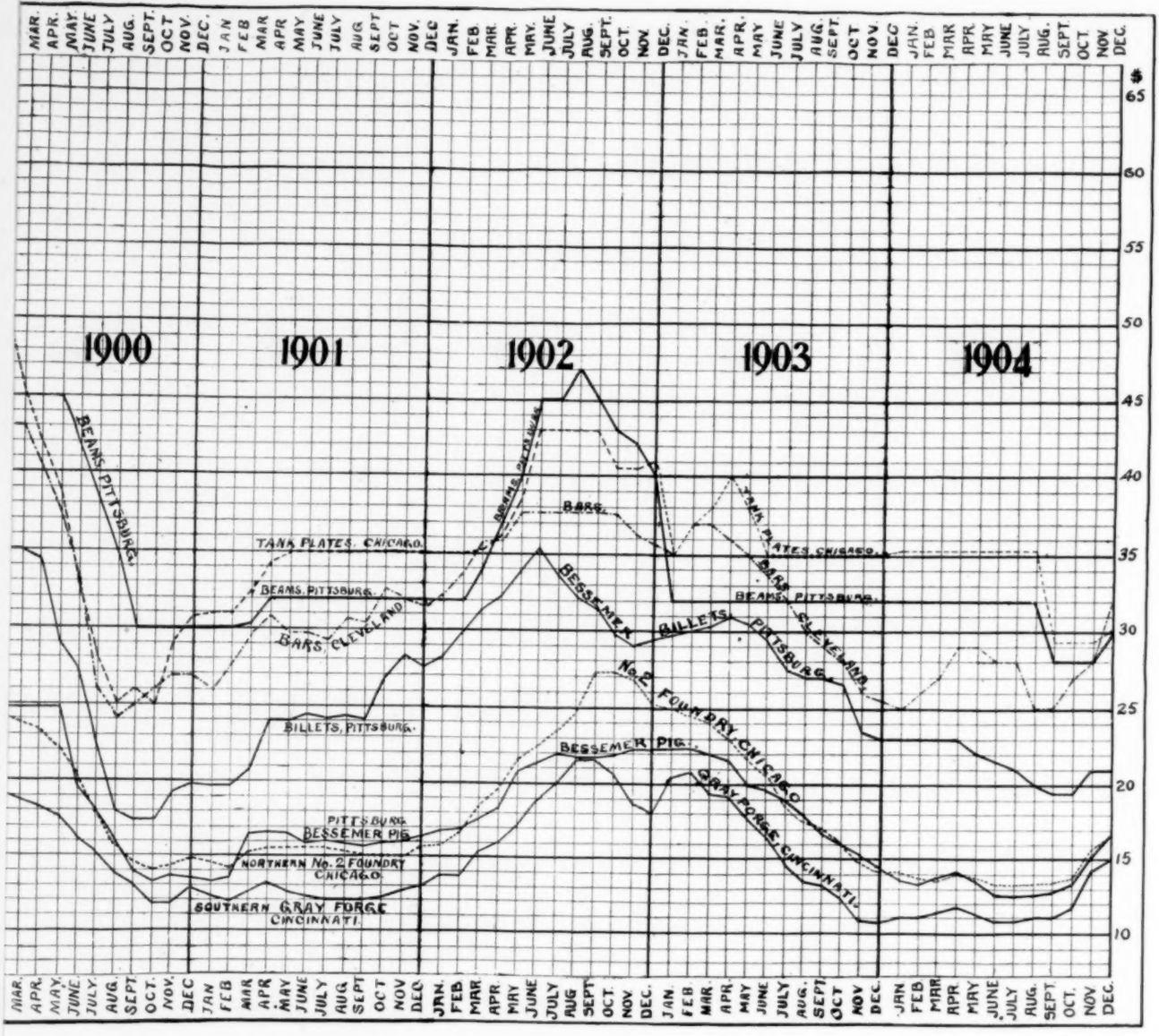
	1897											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	
No. 2 Foundry Chicago	$11.00	10.75	10.75	10.75	10.25	10.00	10.00	10.00	10.25	10.75	10.75	
Gray Forge Cincinnati	$ 9.35	9.05	9.00	8.75	8.00	8.25	8.25	8.50	8.90	9.10	9.25	
Plates Chicago	$25.00	25.00	25.00	24.25	23.00	22.40	22.00	22.00	22.75	24.25	25.00	
Billets (Bess.) Pittsburg	$15.25	15.50	15.50	14.75	14.00	14.25	14.00	14.15	15.75	16.50	15.75	
Bessemer Pig Pittsburg	$10.50	10.65	10.50	10.00	9.35	9.35	9.00	9.05	10.00	10.25	10.25	
Beams Pittsburg	$31.00	31.00	31.00	31.00	26.50	21.25	20.00	20.00	20.25	22.00	22.00	
Bar Iron Cleveland	$23.00	21.25	21.00	19.50	19.50	17.75	18.50	19.75	20.20	21.75	20.75	

	1900											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
No. 2 Foundry Chicago	$24.50	24.25	23.75	23.25	22.00	20.25	17.75	17.50	14.50	14.00	14.25	14.00
Gray Forge Cincinnati	$19.25	19.25	18.75	18.40	17.75	16.25	15.25	12.90	12.00	11.75	11.75	12.75
Plates Chicago	$52.50	50.00	45.25	42.00	38.75	32.75	28.00	25.00	26.00	25.00	29.25	30.75
Billets (Bess.) Pittsburg	$35.00	35.00	35.00	34.50	29.00	27.25	22.50	18.00	17.50	17.50	19.50	19.75
Bessemer Pig Pittsburg	$24.90	24.90	24.90	24.90	24.90	19.75	18.00	16.05	14.00	13.25	13.65	13.75
Beams Pittsburg	$45.00	45.00	45.00	45.00	45.00	41.50	38.00	34.80	30.00	30.00	30.00	30.00
Bar Iron Cleveland	$43.00	43.00	43.00	40.50	37.25	33.00	26.00	24.00	25.00	26.00	26.75	26.75

	1901											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
No. 2 Foundry Chicago	$14.00	14.12	15.19	15.50	15.50	15.50	15.50	15.20	15.00	15.00	15.00	15.50
Gray Forge Cincinnati	$12.25	11.87	12.56	13.12	12.60	12.25	12.00	12.00	12.00	12.25	12.69	13.00
Plates Chicago	$31.00	30.00	32.40	34.40	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Billets (Bess.) Pittsburg	$19.75	19.75	20.81	24.12	24.20	24.44	24.25	24.40	24.12	26.80	28.25	27.62
Bessemer Pig Pittsburg	$13.25	3.60	16.56	16.69	16.65	15.94	16.00	15.90	15.71	15.90	16.10	16.35
Beams Pittsburg	$30.00	30.00	30.40	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00
Bar Iron Cleveland	$25.80	27.80	29.30	30.80	29.80	29.80	29.40	30.80	30.60	32.80	32.00	31.70

	1902											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	
No. 2 Foundry Chicago	$15.80	16.75	18.62	19.75	21.75	22.50	23.40	24.06	27.15	27.15	26.90	
Gray Forge Cincinnati	$13.75	13.75	15.25	16.00	17.05	18.93	20.00	21.50	21.50	20.60	18.87	
Plates Chicago	$35.00	35.00	35.25	36.25	38.60	43.00	43.00	43.00	43.00	40.60	40.50	
Billets (Bess.) Pittsburg	$28.06	29.81	31.37	32.25	33.90	35.18	33.50	32.12	31.50	29.80	29.00	
Bessemer Pig Pittsburg	$16.70	16.93	17.56	18.37	20.95	21.25	22.00	21.75	21.75	21.95	22.25	
Beams Pittsburg	$32.00	32.00	34.00	37.00	40.00	45.00	45.00	47.00	45.06	43.00	42.00	
Bar Iron Cleveland	$32.10	33.70	35.70	35.77	37.70	37.70	37.70	37.70	37.70	37.50	36.20	

RON AND STEEL PRICES, 1895-1904.



AND STEEL PRODUCTS, 1895-1904.

ON AND BILLETS IN GROSS TONS.)

1897									1898										1899									
May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
0.25	10.00	10.00	10.00	10.25	10.75	10.75	10.50	$10.50	10.50	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	$11.25	12.00	14.25	15.00	15.25	17.00	17.00	20.00	22.00	23.00	23.50	24.50
8.00	8.25	8.25	8.50	8.90	9.10	9.25	9.25	$ 8.75	8.75	8.75	8.75	8.75	8.60	8.50	8.50	8.75	8.75	8.75	8.90	$ 9.50	10.50	12.75	13.00	13.25	15.00	16.25	17.00	18.50	19.25	19.25	19.25
3.00	22.00	22.00	22.00	22.75	24.25	25.00	23.00	$23.00	22.50	22.00	22.75	23.00	22.75	23.00	23.50	24.00	24.00	24.00	25.00	$26.50	29.50	39.00	45.00	45.00	53.50	55.50	60.50	65.00	64.00	60.00	58.00
4.00	14.25	14.00	14.15	15.75	16.50	15.75	15.00	$15.00	15.00	15.25	15.25	14.85	14.75	14.75	15.45	16.10	15.75	15.25	16.00	$16.75	18.25	24.00	25.50	27.00	31.50	33.50	36.50	39.00	37.50	36.00	35.00
9.35	9.35	9.00	9.05	10.00	10.25	10.25	9.90	$ 9.90	10.15	10.40	10.50	10.40	10.40	10.35	10.40	10.40	10.30	10.20	10.65	$11.00	11.75	14.00	15.15	16.25	19.00	20.75	22.00	23.50	24.00	24.50	25.00
6.50	21.25	20.00	20.00	20.25	22.00	22.00	22.00	$23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.75	24.00	24.00	24.00	24.00	$26.00	26.00	28.00	30.00	30.00	35.00	38.75	41.25	45.00	45.00	45.00	45.00
9.50	17.75	18.50	19.75	20.20	21.75	20.75	20.00	$20.00	20.00	19.50	20.00	20.00	19.50	20.00	20.00	20.50	20.00	20.00	20.00	$20.50	21.75	27.50	31.00	32.00	34.75	36.75	39.75	43.00	43.00	43.00	43.00

1902								1903												1904									
May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.75	22.50	23.40	24.66	27.15	27.15	26.90	25.40	$25.00	24.00	24.00	23.00	21.70	20.50	18.50	17.50	16.85	15.90	14.50	14.30	$14.10	13.75	13.55	14.00	13.80	13.40	13.30	13.35	13.40	13.70	15.60	16.60
7.05	18.95	20.00	21.50	21.50	20.60	18.87	18.00	$20.50	20.75	19.35	19.20	17.70	16.50	14.60	13.50	13.25	12.50	10.95	10.75	$11.00	11.00	11.25	11.75	11.25	10.75	10.75	11.00	11.00	11.75	14.25	15.00
8.60	43.00	43.00	43.00	43.00	40.60	40.50	41.00	$35.00	37.00	38.00	40.00	37.75	35.00	35.00	35.00	35.00	35.00	35.00	35.00	$35.30	35.30	35.30	35.30	35.30	35.30	35.30	35.30	29.30	29.30	29.30	30.10
3.90	35.18	33.50	32.12	31.50	29.80	29.00	29.25	$29.75	30.00	30.25	31.00	30.50	29.50	27.50	27.00	27.00	26.50	23.50	23.00	$23.00	23.00	23.00	23.00	22.00	21.50	21.00	20.00	19.50	19.50	21.00	21.00
0.95	21.25	22.00	21.75	21.75	21.95	22.25	22.12	$22.35	22.35	22.00	21.60	20.00	19.85	19.00	17.85	16.35	15.85	15.25	14.35	$13.60	13.35	13.85	14.10	13.60	12.60	12.50	12.65	12.75	13.35	15.25	16.60
0.00	45.00	45.00	47.00	45.00	43.00	42.00	40.00	$32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	$32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	28.00	28.00	28.00	30.00
7.70	37.70	37.70	37.70	37.70	37.50	36.20	35.70	$35.00	37.00	37.00	36.00	35.00	33.75	32.00	30.00	29.00	28.00	26.00	25.50	$25.00	26.00	27.00	29.00	29.00	28.00	28.00	25.00	25.00	27.00	28.00	32.00

The Eastern Machinery Market.

OFFICE OF THE *Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., Jan. 3.

The machinery market in this vicinity during December was marked by considerable activity. There were some lines that reflected the dullness characteristic of the closing month of the year, but these were decidedly in the minority, and chiefly had to do with power equipment. But in machine tools and electrical machinery, some very good orders were booked. A feature of the month, even more significant, was that more inquiries found their way into the market than in any month of the old year. As a result, the feeling of optimism in machinery circles reached high water mark. This is in striking contrast with conditions which prevailed a year ago at this time, when there was scarcely a prophecy as to the business outlook that was not charged with some degree of pessimism. It is a noteworthy fact that every machinery man seen by your correspondent and asked how his business in 1904, compared with that done in 1903, said the latter was the better year. The inquiries made covered every department of the machinery trade. The explanation generally given was "the fiction that a presidential year must be bad for business," to quote the remark made by one of them. However, a development of the old year that pleased every one was that as it progressed trade grew in volume, and everywhere the statement was made that the business done in the three closing months of the year was twice as good as that for any like portion of it.

The course of prices was identical with that of trade. In the early part of the year the acute dullness resulted in many concessions being made. Every description of machinery figured in these, but some classes fared better than others in this regard, notably machine tools. Electrical and power equipment were probably most conspicuous in the cutting. But as the year passed and trade became better concessions gradually disappeared. In machine tools these ceased about the middle of September, and thereafter values were fairly sustained. In electrical equipment prices have strengthened a little, but not to the extent of those in machine tools. Prices for engines and boilers at the close of the year were a little firmer.

The year in machine tools was much better than many expected, with considerably more hustling required to get orders than was necessary in the year previous. The number of large orders taken was considerably below the record for 1903. Those that were given were mostly by railroads, but the latter did not purchase nearly so extensively as it was thought they would, although they were larger buyers for the last four months of the year. Government purchases were quite liberal. The business of the year, for the most part, was confined to small orders, but these came in so regularly as to make up excellent monthly totals.

In engines, boilers and electrical equipment large orders did not compare with those which were booked in 1903. New construction was decidedly backward, the number of new industrial and manufacturing enterprises launched falling off considerably. Large orders for engines fell behind, in part because of the turbine.

About the only branch of the trade that suffered from labor troubles was wood-working machinery, due to the fight made for an "open shop" on the part of the planing mill, sash and blind men in the Central and Eastern States.

The foreign machinery trade was much heavier in volume than in 1903. This is attributed in part to machinery merchants showing more enterprise in seeking foreign orders, but mostly to the incentive furnished by the war in the far East. This has been especially observable in machine tools, where purchases by the Japanese government to the extent of about $2,000,000, mostly of lathes, did much to increase the profits of American manufacturers. Russia also bought, but much less heavily. In electrical and mining machinery, and pneumatic tools, increased orders were the rule also. Altogether it can be said that the old year closed with American machinery more widely known and more largely installed in Europe than at this time a year ago.

The new year opens with the brightest prospects for machinery merchants. The conditions which contributed to dullness in 1904 have disappeared. On all sides there are evidences that an era of prosperity has set in, and machinery men are confident, barring unforeseen circumstances, that 1905 will mark a return to the boom periods that prevailed a few years ago, minus the evils of over-capitalization and industrial stock speculation that characterized them.

As to the December machinery market in detail, there is little to be said. In machine tools the feature was activity in lathes, which forced manufacturers to stipulate that shipments could not be made before thirty days, while some were telling customers deliveries might be delayed to nearer sixty days.

The Niles-Bement-Pond Co. found the December business a decided improvement over November. Their inquiries also considerably increased. The company's business for 1904 fell off, roughly speaking, one-third as compared with 1903, but even at that their orders were more numerous than they expected. It is taken to be almost conclusive proof by this company that the trade will have a good year, that the closing months of the old year were the best, alike in orders booked and inquiries received.

J. J. McCabe, machine tools, said his orders were more numerous during the past month. He said business for the past two years has been bad, with 1904 perhaps slower.

Manning, Maxwell & Moore were pleased with the orders they booked during December. As for the year's trading they said it was most satisfactory, all things considered, though showing a falling off as compared with the year previous.

The Prentiss Tool & Supply Co. found December trade excellent. The company's total trade for the year was better than anticipated. It did not come up to its predecessor, however.

Hill, Clarke & Co. booked some excellent orders last month. Their year's business gave them satisfaction, though it fell short of 1903.

Thayer & Co., Inc., steam boilers, did better during last month than any month for the year. Their 1904 business was not up to the year prior.

The Crocker-Wheeler Co.'s local office did more business last month than for several months previous. Manager De Gress said that 1904 totals will come pretty near averaging up to the year previous, with some good contracts practically closed to start the new year with.

The American Wood Working Machinery Co. found December an exceptionally good month—in fact the best since the company was established. The 1904 trade, however, did not come up to that of the year before.

The A. & F. Brown Co., power transmitting machinery, took more orders in December than in November. The business for the year, was not as good as during 1903. The George V. Cresson Co., power transmitting machinery, made a similar statement.

The Hooven, Owens & Rentschler Co.'s local office found conditions for December the same as for November. The business for last year decreased from 10 to 20 percent as compared with 1903.

The incorporation of the W. H. Mullins Co., Salem, O., manufacturer of architectural sheet metal work and statuary, is simply making a close corporation of the business, taking the heads of departments in as stockholders. No stock has been offered on the market.

The Wrought Iron Range Co., St. Louis, Mo., has leased a building at Twenty-first and Wash streets which it will occupy as a branch of the establishment at Nineteenth street and Washington avenue.

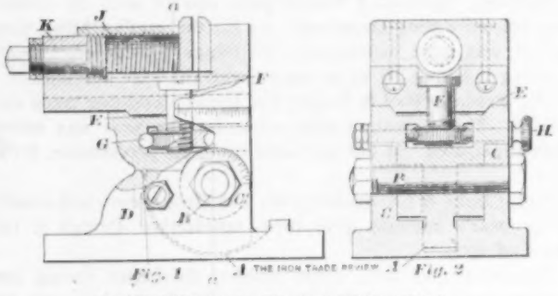
Some New Things for the Shop, Chiefly by Way of the Patent Office.

Machine Tool Vise.

A vise of the jointed or universal type for fine machine tool service has been designed by Claus A. Edlund, of Providence, R. I. The bearing surfaces of the joints are of liberal area and an effort has been made to give the tool great rigidity.

Fig. 1 is a side elevation of the device partly in section and Fig. 2 is a sectional end elevation on the line a-a of Fig. 1. The base of the vise is channeled out at A on a radius from the center of the pivoting bolt B. The base is also counterbored leaving the ears C to receive the corresponding part of the frame which fits between them closely and is pivoted to the ears by the bolt B. A rib fits snugly in the circular recess A and this increased bearing surface is designed to prevent chattering when the work in the vise is being machined. The set screws D are for the purpose of being set up on each side of the rib, locking the frame in the desired position, the screws themselves being secured by the checknuts. This frame may be swung down at an angle of 90 degrees around the axis of the horizontal pivot bolt B from the position shown in the engravings, bringing the face onto the stop on the base or it may be held at any angle between the two points and checked by the set screws.

The circular edge of the base is graduated to facilitate the accurate setting of the frame. The upper face of the frame is counterbored on a bevel at E to receive a similarly machined projection on the under side of the vise proper. This latter part rotates horizontally around a center bolt F which binds the vise by a nut set into a recess in the frame. The nut is threaded on the end of the bolt F and is made in the form of a worm gear, having teeth cut on the outer edge and these are engaged by a screw-threaded shaft G serving as the worm. The shaft G extends through the frame from side to side and has a knurled knob H at the one side and a nut and checknut on the opposite end. A graduated section on the circular edge of the frame is for convenience in setting the vise at the requisite angle as it swings about the axis of the center bolt F.

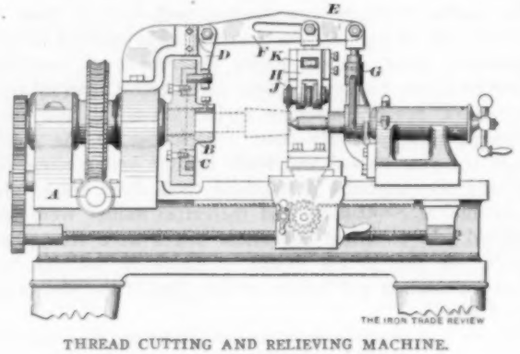


UNIVERSAL VISE FOR MACHINE TOOLS.

The adjustable jaw of the vise has a long tapped hole through the center at J. This hole does not form a complete circle, the bottom of it being open as shown in Fig. 2. A very short screw engages the tapped hole and is at the end of a short shaft, squared at the other end for a handle, and held in the bearing K by checknuts. This bearing K is made integral with the vise bed, semicircular in shape and smaller in diameter than the threaded hole in the jaw. This construction allows the jaw to be drawn completely back over the bearing K and gives the vise a very large opening for a tool of its general dimensions. The inventor further states: "The ordinary method of reciprocating this jaw is by a long rotatable screw which is threaded through a short nut, which nut is fixed to the under side of the movable vise jaw. By this construction the force is applied far below the line of resistance. My method of constructing the vise is much more practical, first, because the power is applied in a direct line of the resistance; second, because the jaws are capable of being opened to their fullest extent, wider than that of any other construction for a given size; third, the screw and threaded portion of the adjustable parts are entirely covered over, thus effectually avoiding the annoyance of chips and dirt falling therein to prevent the free movement of the jaws."

Tap and Die-Making Machinery.

A machine for automatically cutting threads on taps and dies has been designed by C. Berry, of Greensburg, Pa. The inventor says that his object is to provide a machine "Whereby a tap or die may be cut with a great saving of expense due to the decreased time required therefor; the entire operation is automatic and skilled workmen are not required to operate the machine; the rear portion of the thread will be relieved; the parts are readily adjustable for the purpose of permitting the different-sized taps and dies to be cut in the same machine and at the same time to have the same rigid and accurate while operating upon any sized tap or die." How far this purpose is met by the construction will be seen by an examination of the engraving.



THREAD CUTTING AND RELIEVING MACHINE.

The illustration shows an elevation of the machine, a portion being shown in section. The invention consists on providing a milling cutter, the cutting edge corresponding with the angle of the thread, the cutter mounted in a reciprocating carriage controlled by a cam. The tap holder and the cam are driven by a worm and gear and train of gears leads to the feed screw by which the milling cutter is fed over the work. The rotation of the milling cutter is obtained from a separate driving mechanism at the back of the machine tool, operated by an additional belt from countershaft, and the speed of the cutter is in this manner not dependent upon the rotary velocity of the tap or die. Means are provided for ready disconnection of the feed screw and when the cutter has been fed over the work it can be quickly restored to the initial position.

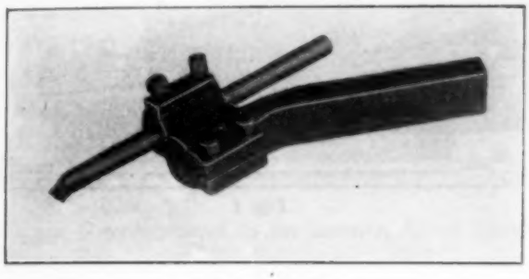
The housing at the left supports a shaft carrying a worm gear in mesh with a worm mounted on the shaft and bearings A. The worm gear shaft is threaded at the nose for a chuck B and has a recess for a cam C fastened in place by screws. The chuck has a gib and screw at the forward end to receive and hold tap shanks. The milling cutter J is attached to a shaft with gears between two supporting links, the shaft passing through an opening in the links and through an extension of the carriage H. The vertical movement of the car-

riage and cutter is thus permitted by the train of gears and the links and at the same time the milling cutter can be positively driven. The carriage H is connected with the cam C through the lever and slide D and F, the lever being fulcrumed at the outer end to the bracket on the tailstock of the machine. The carriage H is attached to the lever by a clevis E, the relation of the two being adjustable by the nut E. This clevis has a bolt passing through the squared plug sliding in the slot in the lever F. When the inclination of the slot is the same as the taper of the tap, the relief portion of the rear end of the tap will be greater than at the front end, due to the increased downward throw of the milling cutter as the latter leaves the fulcrum of the lever where the cutter is connected. This increased relief at the large end is advisable in taps employed especially for threading pipe fittings. It will be noted that by increasing the inclination of the slot with regard to the longitudinal axis of the tap the degree of relief given to the tap at the rear may be decreased.

The slide D moves vertically in the bracket on one of the uprights and is gibbed to take up wear. The lower end of the slide has a pin engaging the cam slot in C. The rear end of the lever F is fulcrumed to the clevis and adjusted by a nut G for varying the taper on the tap or die. The carriage on the ways of the machine is returned to the starting point by hand after cutting the threads.

Toolholder Improvement.

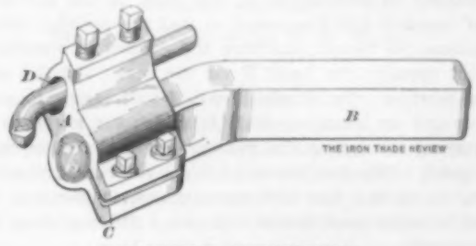
James F. Pullan and Joseph X. Mathieu, of Great Barrington, Mass., have a toolholder for use on lathes and this is illustrated in the engravings. The means adopted for holding the cutting tool so that a greater or less length of shank may project into the bore are not of any especial degree of novelty and the real interest of the device centers in the arrangement adopted for raising and lowering the tool without losing the horizontal position of the tool shank or changing the position of the holder in the tool post of the lathe.



A NEW TOOLHOLDER.

The line drawing shows a perspective view of the toolholder made in accordance with the dictates of the invention and having a cutter in position. The toolholder is designated as A and this has a shank B for insertion into the tool post of the lathe. The two parts A and B, the head and shank of the toolholder are fitted to each other, and head being bored out to enclose the turned end of the shank which forms a firm axis for the rotation of the head. The head A is slit through at C and the flanges at each side of the slot are drilled for collar screws. These clamp the head securely on the turned end of the shank. The head A is also provided with an opening and set screws for the reception and grip of the cutting tool. This opening D is by the way obovate in shape according to the accepted patent phrase, from which it may be understood that the cross section is oval, the small end down of course.

The adjustment of an offset tool in the tool post for the purpose of boring out a casting held in the chuck is one of the things annoying for which there has seemed little help but mechanical wit sustained by a stock of patience. The smaller the hole in the work, the deeper the job and the greater the necessity for holding the tool shank horizontally to clear the sides of the bore. It will readily be seen that once the inside tool is in position, parallel with the axis of the lathe, and the head A can be swiveled around the pivot



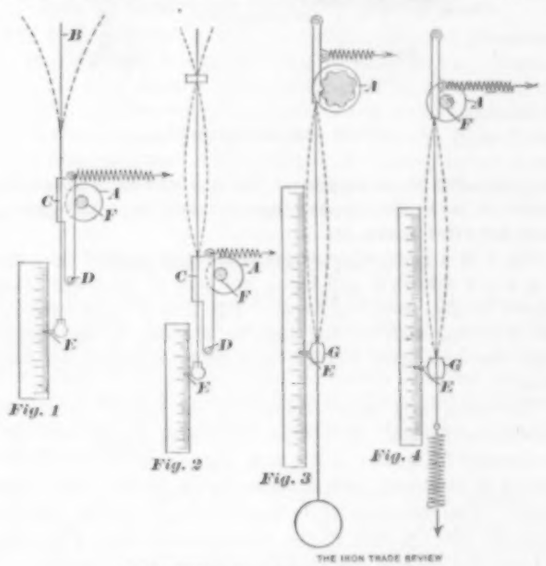
TOOLHOLDER ADJUSTABILITY.

to suit the taste of the lathesman and at the same time need no further tinkering at the tool post.

Measuring Shaft Rotations.

The method patented by Hermann Frahm, of Hamburg, Germany, is based on the peculiar circumstance that elastic materials oscillate in case small forces act upon them in certain intervals, the intervals corresponding to the period of oscillations of the material. It is evident that the period of oscillation of a spring or taut string can be altered by changing the length of the material so that each length corresponds to a certain period of oscillation. If now small forces are imparted in certain intervals from a rotating shaft the revolutions can be determined by ascertaining that length of the material having the largest oscillations.

The engravings show several methods of carrying the scheme into effect. Fig. 1 is a device in which a freely oscillating spring is employed. Fig. 2 shows an arrangement where the spring is fixed at both ends. Figs. 3 and 4 illustrate how the method is carried into effect with a string instead of a spring. Identical parts in the several engravings are designated by the same letters. The shaft A in Fig. 1 is to have the number of revolutions counted. An elastic spring B can be shifted up and down in the slot C of the lever pivoted at D. The number of the oscillations of the spring can be adjusted by the up and down movement. The non-oscillating end of the spring has a band at E located on a scale giving the oscillations. The rotating shaft has a pin F



REGARDING THE SPEED OF SHAFTS.

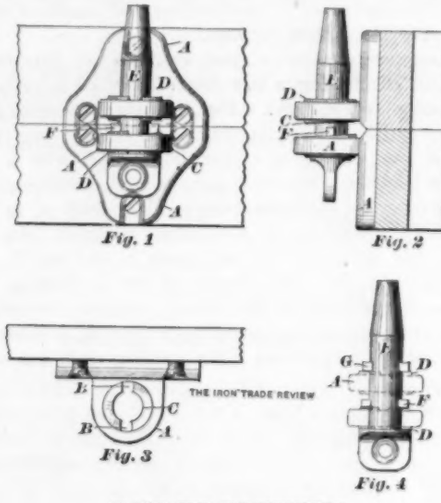
fixed eccentrically at the end of A. The lever is drawn toward the shaft by the spiral spring. The rotation of the shaft will therefore oscillate the spring B.

It has been found that the upper part of the spring B will have increased oscillation when the natural oscillation corresponds with the movement of the pin F. Now, in order to find out the number of revolutions of the shaft A the spring B is shifted upward and downward to find the position when the oscillations are largest and then the number of rotations can be read opposite the hand E on the scale. In the case of shafts rotating very slowly it will be necessary to provide gearing and an auxiliary shaft to which the pin F is fixed, the gearing connecting the auxiliary with the main shaft to gain speed. The oscillations of the lever can be readily increased by using a disc with several cams, as shown in Fig. 3. It will be understood that in this case a different scale has to be employed.

In order to be able to use a scale with greater divisions it is advisable not to employ the oscillations of the free end of a spring but to use a spring fixed at both ends, as in Fig. 2. In this instance the divisions of the scale must be twice as large as in the example seen in Fig. 1. It is convenient to use strings or wires stretched by a weight, as in Fig. 3, or a spiral spring, as in Fig. 4. In this case a slide G is provided which can be moved upward or downward by hand or any convenient device until the point of the maximum oscillation is attained.

Connecting the Flask.

James Cunningham, of Florence, Mass., has a patented pin connection for aligning the cope and drag of a molding flask



FLASK PIN IMPROVEMENT.

and clamping them together. The pin can be inserted from above or below the bracket lugs and may be withdrawn and used for other flasks, etc.

Fig. 1 is a front view of the connection applied to a flask. Fig. 2 is a side view and Fig. 3 is a plan of the lower bracket shown in the preceding views. Fig. 4 is a front view of a pin provided with locking lugs in addition to the clamping lugs, the associated bracket ears being indicated by dotted lines.

The three first views show the pin applied to the two sections of a flask. A bracket comprising a plate and ear A is fastened by screws to the cope and a similar bracket is attached to the drag, both brackets being in the same vertical plane. The ears project forward from the plates and have slots B. On the side of the ears near the supporting plates are cam surfaces C, one of them starting from the side of the forward slot B and ending at the corresponding side of the rear slot B, increasing in thickness from front to back. A similar cam surface is around the other side of the opening through the ear. Flanges are formed on the ears as at D as bearing surfaces for the head of a pin E. These flanges bound opposite sides of the holes and slots in a similar manner to the cam surfaces C.

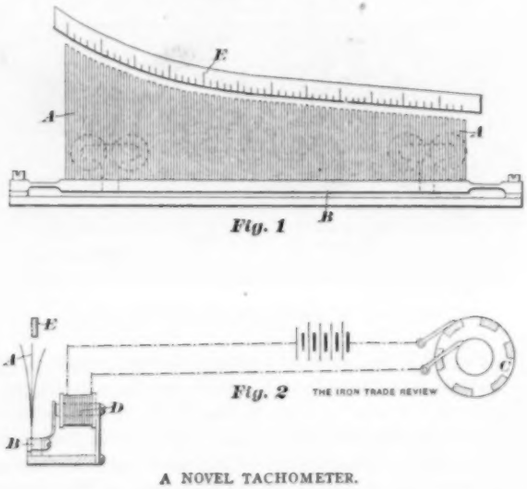
The pin E has the head at one end and oppositely disposed lugs F intermediate of the head and the other end of the pin. The pin E fits the hole in the lug and the projections F slide through the slots and when the pin is turned ride on the cam surfaces C. The rotation of the pin locks the ear between the lugs and the head.

In addition to providing means for aligning the halves of a flask it may be necessary to fasten the sections together so that the cope cannot be lifted from the drag. In Fig. 4 two additional lugs G extend from the pin E between the lugs F. These lugs are arranged to engage the flanges D on the ear through which the pin last passes when the latter is turned to bring the projections F into engagement with the cam surfaces.

Special Measurement Apparatus for Shafts.

This invention has also been devised by Hermann Frahm and is based on similar principles. Fig. 1 is a front view of the apparatus and Fig. 2 is a side view. A represents a series of springs with different natural oscillations. These oscillations can be obtained by various lengths of the springs or by different diameters and shapes. The springs A are fixed to an oscillating metal piece B which can be oscillated from a rotating shaft in any convenient manner. In the example shown in the engraving electricity is employed for oscillating the metal piece B.

C is a disc having several contact pieces and attached to the



A NOVEL TACHOMETER.

rotating shaft. During each revolution of the shaft a circuit is closed in certain intervals by the disc C. The electric current from the battery, and which is interrupted by the disc C, is led around an electro magnet D and the circuit is completed by connecting the shaft and the disc C. The magnetism produced when the circuit is closed attracts the armature of D, and the armature being attached to B oscillates the springs at A as the circuit is successively opened and closed. That spring in the series at A which has a natural period of oscillations corresponding to the intervals imparted by the magnet to the metal piece B will have the largest oscillations. As it can readily be seen during the working of the device which spring has the largest oscillations the number of rotations of the shaft can be determined. The number of rotations corresponding to the natural period of oscillations of each spring may be printed upon the springs or on a scale E situated above or at the side of the springs, the whole forming an unusual type of tachometer.

A New Milling Tool.

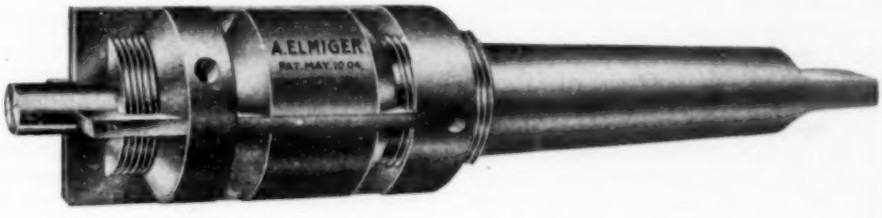
This is an adjustable hollow milling tool for turning or milling stems, rods and facing shoulders. The mill can be

adjusted for wear and grinding and the cutting edges of the blades moved toward or from each other so that the stem may be turned to any size desired. When any of the blades are broken a new one is readily inserted.

The mill has a hollow body, having a taper shank for spindle hole in the drill press or lathe, with reduced screw threaded ends. The slots taper on their bottoms from the shank to the other end and have blades to fit the slots. Each blade will rest firmly upon the tapered bottom of the slots and the cutting surface will be parallel with the body. The blades are notched to fit the nut collars by which they are adjusted and held in proper position to do the work.

The illustration shows the cutting blades in proper position for use. Each end of the body is reduced in size, and the reduced part is provided with screw threads to receive the nut collars upon the outer surface of the body. The longitudinal slots at the working end of the body extend entirely through the wall to the cutting end. Each nut collar is provided with a hole to provide for easy turning by means of a wrench.

The same tool is readily equipped with a pilot pin and used for a counterbore. The pilot is inserted and easily changed to any size and so on as needed, and therefore saves the expense of having a number of counterbores for different sized screws.



MILL WITH PILOT PIN.

The tool is manufactured by the inventor, Albert Elmiger, of Dayton, Ky.

The Test of Armor Plate.

Since preliminary tests of armor plate made by the Midvale Steel Co. have proved satisfactory, there has been much newspaper talk about the prospect of competition between the Midvale and the Bethlehem and Carnegie Steel companies, and concerning an offer made by John W. Gates to the government in 1896, about which Mr. Gates has made the following statement: "I did cause a bill to be introduced in Congress providing that if the government would give its entire orders for armor plate to the Illinois Steel Co., of which I was president, for 20 years, with a minimum tonnage of not less than 6,000 tons per annum, that we would erect works and furnish the armor plate at $240 per ton. I did this at a time when there was bad feeling between the Carnegie Steel Co. and the Illinois Steel Co., brought about by trade relations which were not pleasant, and I did it without consulting with any director or officer of the Illinois Steel Co. This was, however, at a time when ordinary steel products were selling for 50 percent of what they are now selling for. Bessemer pig iron was about $8 per ton, as against $16 now; labor was very much less than at the present time, and I doubt whether any concern could make armor plate today at a profit at a price much less than that at which it is now being furnished by various concerns to the United States Government. In fact, considering the amount of money required for an armor plate plant, I believe the concerns would be better off if they increased their blast furnace and open-hearth and Bessemer capacities than they are now, when they are crowding in high-priced materials for which there is only a limited demand of a very uncertain nature. I do not look for any trade price war in armor plate."

The Retirement of Dr. N. P. Hulst.

To the Editor:

The connection of Nelson P. Hulst, Ph. D., with the Oliver Iron Mining Co., at Duluth, as vice president, closed Dec. 31, and he has re-located at Milwaukee, his old home. Dr. Hulst has been long enough in the service and has left a mark amply sufficient to deserve a complete rest, and he has always kept himself so well in touch with general culture that he will have avenues of mental enjoyment not vouchsafed many men who have worked so hard in most exacting professions and reached a corresponding age. The Lake Superior mining region honors him and congratulates him upon his entry into what will probably be a most enjoyable period of his career, as well doubtless as profitable to all that can derive benefit from the results of research and study on the part of a man of ripe culture and discipline of mind. It is, perhaps, not generally known that when Dr. Hulst's decision to retire was announced his employers held out every inducement for him to remain in a consulting capacity, that they might have advantage of his scientific knowledge and practical skill without seriously incommoding him in the plans he had formed for the future. But it was of no avail; his decision was fixed and could not be shaken by a most flattering offer.

Dwight E. Woodbridge.

Largest Generators Driven by Gas Engines.

The California Gas & Electric Corporation, San Francisco, has placed an order with the Crocker-Wheeler Co., Ampere, N. J., for three 4,000-k. w. capacity, 3-phase, 13,200-volt, 25-cycle, 88-r. p. m., revolving field alternating current generators to be driven by 5,400-h. p. gas engines built by the Snow Pump Co. These generators are the largest in capacity in the world driven by gas engines, and will furnish power for operating all the street railways in San Francisco and vicinity.

American Skein & Foundry Co.

By an error the heading "American Skein & Foundry Co." appeared in our issue of Dec. 22 over an article referring to the plans of the Southern Skein & Foundry Co., recently organized at Chattanooga, Tenn. It should be stated that the American Skein & Foundry Co., a well known and established company, has no connection whatever with the proposed Southern company.

The Allis-Chalmers Co. opened new sales offices in Philadelphia on Jan. 1 in the Land Title Building. The offices heretofore maintained by the electrical department of the company in the North American Building have been removed also to the Land Title Building. The new offices are under the charge of W. A. Wood.

The Canada Corundum Wheel Co., Hamilton, Can., is building an addition in order to take up the manufacture of vitrified wheels.

The Pittsburg Iron Market in 1904.

By A. O. BACKERT.

The uncertainties of the iron and steel trade were well illustrated in the year which has just come to a close. There were flurries and upward movements, followed by as many downward movements which carried prices to new low levels for the year. A sudden change in trade conditions set in in the latter part of September, and has resulted in the resumption of nearly every idle stack, steel works and rolling mill in the entire Pittsburg district. It has gathered such force, indeed, that the demand in finished products has practically overtaken production, while pig iron consumption has exceeded production. Such is the sensational ending of a most uncertain year.

The lowest prices on pig iron reached since 1898 were recorded at Pittsburg in the summer months, and the upward movement of the past three months can be compared with the sensational advance in values early in 1899. From the low points of the summer the advances range from $4 to $5 on the different grades of pig iron, and conditions seem generally favorable to still further advances in 1905. Some lines of finished material also touched low points that have not been equaled in recent years, though making complete recovery in the last three months of the year. The output of pipe, tin plate and wire products will compare favorably with, if not exceed, last year's production, but the production of rails, structural material and plates will fall short of the totals of 1903. The refusal of the railroads to continue improvements, the stoppage of all large undertakings, and the limited buying of rolling stock, had much to do with the falling off in heavier lines. The number of freight cars purchased during the year will approximate 60,000, which is about 100,000 below the purchases the previous year, as well as of 1902. Car works will carry into the new year close to 70,000 steel and wood cars on their books, and the new rolling stock that is being figured on is prodigious. In addition, the rail requirements promise to be large, although the tonnage on the books of the rail mills at the close of the year is not as great as at this time last year.

New Producing Capacity.

Few new iron and steel works projects have been undertaken in this district during the year, although the revival in demand has already brought out several. Plate capacity is to be increased by the erection of an 84-in. mill by the LaBelle Iron Works and a 72-in. mill by the Allegheny Steel & Iron Co., while in Eastern Pennsylvania the structural capacity will be still further increased by the addition of a beam mill to the equipment of the Eastern Steel Co. The Republic Iron & Steel Co. is installing a combination rail and sheet bar mill at Youngstown, while during the year the Carnegie Steel Co. placed its 140-in. plate mill in operation, and the Lackawanna Steel Co. completed a plate and a structural mill. The steel-producing capacity of the Jones & Laughlin Steel Co. is being increased by the erection of four Talbot furnaces. There have been no new blast furnace projects in this district during the year, although two—the Zug Steel Co. and the Pittsburg Steel Co.—are now under way. The absorption of the Clairton Steel Co. by the United States Steel Corporation was one of the anticipated events of the year. The plant has been placed under the management of the Carnegie Steel Co. and this company now operates 51 blast furnaces. Of the new furnaces it had under construction in 1904, two at South Sharon, one at Clairton, two at New Castle and one at Youngstown were completed, while the finishing touches were put on the Donora stacks. For the first time 49 of these 51 stacks are in operation and even this tremendous output of iron is not sufficient to meet the demands of the company's steel works. The Jones & Laughlin Co. added another furnace, as did the LaBelle Iron Works and the Wheeling Steel & Iron Co.

Labor Union Losses.

The year has been most disastrous for the Amalgamated Association. Starting with a wage reduction of 10 percent in the sheet mills, a further reduction of 8 percent was forced in April, while the tin plate workers were forced to accept an 18 percent reduction. The Republic Iron & Steel Co. also forced a reduction in the iron scale, while the mills of the American Steel Hoop department of the Carnegie Steel Co. were entirely lost to the association. A number of independent mills were also lost.

The drouth in Western Pennsylvania during the months of October, November and part of December greatly curtailed the output of the coke region, interfered with transportation and reduced the output of steel works and blast furnaces. Not in many years was so prolonged a dry spell experienced, but this was another one of the unexpected developments of a most uncertain year.

Pig Iron.

Not since 1898 has the iron trade seen as low prices as prevailed in the summer months, and only such a boom year as 1899 can parallel the advances in all grades of pig iron made in the last three months. At the beginning of the year the iron trade was passing through the most drastic curtailment movement ever attempted in the trade. Of the furnaces tributary to the Lake Superior ore region only 35 percent were active on Jan. 1. When the curtailment of production was first undertaken in October of 1903, it was believed that 25 percent would be sufficient to meet the changed conditions. Consumption, however, fell off tremendously and to prevent the accumulation of stocks, merchant and steel works furnaces were banked or blown out as soon as the demand failed. Nor were the prevailing quotations profitable to the few stacks in operation, high priced ore and coke preventing the actual production at most of the merchant furnaces at much below $12 a ton. Heavy purchases of ore the previous season when prices were at their high point, coupled with the tremendous falling off in production, left most of the furnaces with sufficient stocks on their hands to carry them well through the summer months. With heavy losses to be charged off in some manner on account of the high priced ore tonnage carried in stock, the operators were in no mood to contract for their next year's requirements at anything like the prices prevailing the previous year. Furthermore, they notified the ore producers that their large stocks would greatly reduce their season's purchases and to meet these new conditions the Lake Superior ore producers met in Cleveland early in February to fix prices and determine the season's output. Opinions differed widely as to price, but the impression prevailed that the season's output would not much exceed 14,000,000 tons. That the season's water shipments should exceed 21,000,000 tons is only one of the many surprises of the year and indicates how poorly those in closest touch with actual conditions foretold the future of the trade.

Iron quotations early in January were largely nominal, and not until late in the month were there sufficient transactions to gauge the market. Bessemer iron was down to $12.50 and $12.75 at the furnace, while forge iron was already being sold under $12, the figure below which many of the furnace operators said they would not sell. An improvement in demand set in in February, merchant and steel works furnaces

resumed as fast as they could be put into shape, and the general situation was strengthened by the purchase of Bessemer iron from merchant furnaces by the United States Steel Corporation. For March delivery 65,000 tons was taken outright at $13.85 Pittsburg, which was from 25 to 50 cents a ton higher than the prevailing prices. Options were also taken at the same price on more than 100,000 tons for March and April delivery. A few days after this purchase was concluded a meeting of the Lake Superior ore producers was held. The leading steel interests did not favor a reduction greater than 50 cents a ton, and this purchase of Bessemer iron was considered to have been timed with a view to swinging the merchant ore producers into line, the latter having advocated a reduction of $1. The ore meeting again adjourned without result. In the meantime the Bessemer purchase had a very beneficial effect on general conditions, and when the option on the April iron was exercised it was generally believed that the market had reached its turning point. On April 1, 92 percent of Steel Corporation blast furnaces were in operation, while outside interests had all their available capacity active. Prices advanced slightly, but the failure to reach an association agreement on the season's ore prices prevented consumers from buying for forward delivery. An open ore market was declared after another ineffectual attempt to reach an agreement in New York and was sold at prices ranging from $1 to $1.25 below those of the previous season. Consumers of ore not only covered season's requirements, but contracted in many cases for a term of years. As practically all the large consumers are covered in this way in part at least, the season's ore prices will not be of the same importance in the future as in the past.

Not knowing what course the market would take in view of the unexpected action of the ore producers, consumers began to hold back iron purchases, and the refusal of the corporation to exercise its option on Bessemer iron for May delivery still further increased the hesitancy of buyers. Furnaces were shut down, and values sought a lower level. During the month of July the lowest prices of the year were reached. Bessemer sold at $11.40 at the furnace, forge at $10.90, basic at $11.15 and No. 2 foundry at $11.35. In the meantime Southern furnaces were also attempting to establish new low records, forge iron having come into Pittsburg on the basis of $7.65 Birmingham. Other grades of Southern iron were proportionately low. Northern furnaces were at this time scrambling for an opportunity of furnishing the iron for the New York tunnel castings and Valley stacks took upwards of 50,000 tons, which nets them about $11.50 a ton. Realizing that prices were practically as low as they could possibly go, cost of production alone considered, large consuming interests came into the market during the latter part of August and September and covered requirements through the first quarter of 1905. Prices were not actually affected until the latter part of October, and the continued heavy buying of all grades of iron by large interests resulted in the late upward movement. The entire situation has changed within less than three months. Production has increased in that time from an annual rate of 15,500,000 tons to over 19,000,000 tons, and with furnaces operating as at present throughout the country there is little to fear for the early months of 1905. Price advances in the past two months have been rapid, Bessemer advancing from $12.50 at the furnace in October to $16, which is quoted at present. Like advances were made in other grades. With the beginning of the new year the Carnegie Steel Co. had 49 of its 51 blast furnaces in operation, and despite this great daily production of iron, the corporation was compelled to purchase 25,000 tons for December delivery from the merchant furnace interests.

The last three months of 1904 showed that even with the tremendous increase in iron producing capacity in the past few years, consumption is not lagging behind. The merchant furnaces, despite the organization of the United States Steel Corporation, continue to prosper, and have found a field for their iron outside of this great consolidation. No new blast furnaces are projected, although a number of propositions are under consideration. Merchant furnaces in the Valleys have been extensively improved during the year, the long period of depression being propitious for such work. With the increasing consumption of Mesabi ores the tendency is towards lower stacks with a smaller output, and practically all new furnaces are designed on these lines. On the other hand, many operators of furnaces making a specialty of foundry iron do not adopt the skip hoist, and adhere to hand filling with its greater cost, declaring that no automatic filling arrangement has yet been devised that will insure proper distribution of the stock as by the old method.

Billets and Sheet Bars.

The billet association, which so successfully maintained its organization for nearly three years, was threatened with disruption during the summer months as many transactions would hardly stand close scrutiny. As the trade conditions strengthened later in the year, these shortcomings were forgotten, and with the "official" price several dollars a ton below the actual market these agreed prices will be maintained without difficulty. The price of $23 on billets, which was made at the end of 1903, did not prove attractive to consumers and the buying during the first three months was to cover immediate requirements entirely. In May reports of price shading were numerous, and as the demand dropped off, competition for new business grew keener and concessions from $2 to $3 a ton were made. In July a meeting of the association was held for the purpose of looking into the reports of price violations, and a committee was appointed to investigate all future sales. Nothing of importance was learned by this investigating committee, although price violations were repeatedly reported, but the public announcement of the order taken by the Republic Iron & Steel Co. on a conversion arrangement with the Pittsburg Steel Co. was too serious to pass over. On the actual delivered price the concession from the official price was $4.25 a ton. The Pittsburg Steel Co. furnished the Republic company 110,000 tons of Bessemer, which was purchased at $12, the conversion price being a trifle over $6, which would make the actual delivered price about $19.25. The official price at Monessen was $23.50. Efforts to have the tonnage divided proved unsuccessful, and rather than break up the association the matter was allowed to rest without any action being taken. The cutting of prices grew to be so open, however, that it became absolutely necessary to preserve the organization and in September base prices were reduced $3.50 a ton. The differential existing between sheet bars and billets was again increased from $1 to $2 per ton. About this time the market commenced to steady and late in October mills were asking slight premiums. In November an advance of $1.50 per ton was officially made, and at another meeting in December prices were reaffirmed, although premiums of $2 could easily be secured.

The steel situation as it applies to the independent finishing mill has not changed during the year. All of the large steel producers were anxious to sell billets and bars in quantities with no demand for them from their own finishing departments, but the slightest revival in trade results in an immediate tightening of the entire supply. The open-hearth furnace, with its comparatively small unit, seems to be the only salvation for the small producer of finished material. At Canton, O., a small plant of this kind was installed by the United Steel Co., containing two furnaces and a sheet bar mill. The Allegheny Steel & Iron Co. is another example of this type of self contained plant, now adding another furnace and making additions to its finishing department. The Jones & Laughlin Steel Co. is making the most notable addition to steel producing capacity in this district, in building four Talbot open-hearth furnaces, the one now in use having proved both

successful and economical. These furnaces have an output of about 1,600 tons weekly, and the company's steel producing capacity will be increased from 1,275,000 to 1,600,000 tons annually.

At Youngstown, O., the Republic Iron & Steel Co. is installing a combination rail and sheet bar mill. Independent sheet manufacturers are experiencing more difficulty from year to year in securing a supply of bars, and the tin plate manufacturers are confronted with the same undesirable conditions. It is to assist in supplying this trade that the combination mill is being installed. At present the bar situation is strongly held and where concessions could be secured on billets during the summer months, none would be given to the purchasers of bars. In addition to the mill of the Republic Iron & Steel Co. further bar capacity is expected, and some of the leading independent sheet and tin plate producers will take up this question early in the new year.

The rod situation has remained in strong hands throughout the year. Apart from the American Steel & Wire Co. the Pittsburg Steel Co. is the one important producer in the Central West, and as both operate finishing mills it is only natural that they should aim to hold rods at a price that would make it unprofitable for a finishing mill to pay the price demanded and compete. Only for a short time during the summer could rods be had at $27, and shortly after this price was made plain wire was reduced to $29, the spread throughout the year being considerably less than the conversion cost. The year closed with rods selling at $31, chain manufacturers having covered their requirements for the first half of the year at this price. The tonnage thus closed was greater than ever before taken by the manufacturers of this product.

Structural Material.

The depression which affected all trades the greater portion of the year resulted in the postponment of many new undertakings. The railroads practically stopped work on all improvements, and but for the few important projects that were not disturbed by the trade depression, the output for the year would be exceedingly small. The largest tonnage went into elevated tracks in Chicago, Boston and Pittsburg, while the building requirements were exceedingly small as compared with former years. It was expected that in rebuilding the burned section of Baltimore thousands of tons would be required, but the delays encountered in redistricting the destroyed section has put off much work for another year. The steel car and shipbuilding industries did not nearly take their quota of material, and as a result the large mills in this district operated about half time the greater part of the year. It is needless to add that competition among the fabricators was keen on all work that came up, and, owing to the low prices made, suspicions were directed toward certain mills believed to have a working agreement with fabricators and erectors. Other mills not having such alliances fought back with prices which would make it possible for their contractors to secure business and this pool was threatened with disruption for the first time in several years. The Lackawanna Steel Co. also came into the field as a formidable competitor and it is needless to say that this company was soon heard from.

A meeting of the association was held in July, but prices were reaffirmed. Matters, however, went from bad to worse, and in September a reduction of $4 a ton was made to $28 and a price was fixed for fabrication and erection. Since this action was taken no irregularities have been reported, although an old option is taken up by contractors here and there which still results in some feeling. The outlook for the new year is exceedingly bright. Railroads are proceeding with improvements stopped a year ago, large contracts having been placed in December by many of the leading trunk lines. About two weeks ago an advance of $2 was made and it is believed that before many weeks the market can be put back on its former basis of $32 a ton.

Outside of the Lackawanna Steel Co. there has been no increase in structural capacity in the year. In the eastern part of the state the Eastern Steel Co. is adding a beam mill, while in the west a structural mill is to be erected by the Illinois Steel Co.

Plates.

The plate producing capacity, which was swelled during the year by the plate mill of the Lackawanna Steel Co. to proportions far exceeding the possible consumption, is to be still further increased this year by the erection of mills in this district. The LaBelle Iron Works is adding an 84-in. mill, while the Allegheny Steel & Iron Co. has a 72-in. mill under way. The material to be produced by the LaBelle Iron Works will be largely used by steel car plants, while the Allegheny Steel & Iron Co. will increase the supply of skelp for the independent pipe producers.

Owing to the limited buying of steel cars by the railroads, this tremendous tonnage of plates upon which the mills have been depending for their greatest volume of business failed almost entirely, and the shipbuilding industry took about one-third of its requirements of former years. None of the plate mills operated more than two or three days a week, and owing to the keen competition, price cutting ranging from $3 to $4 a ton was reported almost constantly the first eight months of the year. The installation of numerous universal mills that could readily roll narrow plates resulted in the shading of prices on these sizes, and, recognizing this changed condition, the association, at a meeting held in September, made a reduction on plates 24 in. and under amounting to $6 a ton, while wider plates were reduced only $4. With the lowering of the price of raw material, the car works were in position to make better prices on their product, and the railroads, sadly in need of cars, not for additional equipment, but for replacements alone, began to place heavy orders. The Pennsylvania Railroad Co. bought close to 12,000 cars and an additional 8,000 are under contemplation. Other roads also bought heavily. Steel car works have large orders on their books with which to begin the new year, and it is estimated that the total number of freight cars for next year's delivery already placed with the car companies is close to 70,000. The requirements of the boiler and tank manufacturers have been unusually light throughout the year, and unless a large amount of new work is undertaken next year, little improvement in the tonnage from this trade is anticipated. The Carnegie Steel Co. this year placed its new 140-in. plate mill in operation; this and the mill of the Lackawanna Steel Co. were the only additions to the plate capacity.

Bars.

The year has not been very prosperous for the producers of iron and steel bars. The large continuous mills in this district have not operated steadily, nor will they run full the next year, as the increase in the number of merchant mills throughout the country is more than keeping pace with the demand. Almost every scrap producing center has its iron mill, while the small rail rerolling mills are nearly all producers of steel bars. The requirements of the agricultural implement works have been considerably below normal, and the curtailment of the railroad demands made it an unprofitable year for the mills. The spread between billets and steel bars has been maintained at a very low point, so that the rerolling mills are practically the only small independent producers that are able to compete with the association mills. Small iron mills on the other hand continue to thrive and increase in numbers, although the steel producers predict that their necessity for existence grows smaller from year to year.

At the beginning of the year Bessemer bars were held at $26, with open-hearth at an advance of $1. After practically all the consumers of Bessemer bars covered an advance of $1 was made in March and this price was maintained until September, when a reduction of $1 was made. In December

Bessemer was advanced $2 and open-hearth $1, but these latter advances are small as compared with the prices that the iron mills have been securing during the last two months of the year. Although sales of assorted sizes of iron bars were made as low as $24 during the summer months, at the close of the year $33 is being secured, and with still higher prices in view.

The cutting on hoops was pronounced early in the year, when contracts were closed on the basis of 1.25c, and even as low as 1.20c was reported. After practically all the large business was corralled the hoop manufacturers decided to fix a uniform price and advanced prices to $31 a ton. Owing to the large cotton crop, the demand for cotton ties was greater than ever before, about 50,000 tons of this material going south. Most of this material was sold on the basis of 75 cents a bundle, although 80 cents was secured for small lots.

Muck bar prices fluctuated with forge iron, selling as low as $23, and closing the year above $28. Most of the mills in this district now producing muck iron use the same in their finishing departments, and Pittsburg is not as great a producer of this material now as in years gone by.

Pipes and Tubes.

Although the year has been disastrous so far as prices are concerned, the production will exceed that of last year, and will almost equal that of 1902, the greatest in the history of the pipe trade. The development of oil and gas fields in Kansas and Indian Territory had much to do with this large production, for the merchant pipe and boiler tube demand was below normal almost the entire year. The tonnage of line pipe to develop this new territory placed by the National Transit Co. was greater than that required in the development of any great field open heretofore, and with other lines built during the year, it is estimated that the total tonnage of such pipe purchased will aggregate 225,000 tons for the year. In addition outside oil and gas interests made developments that required miles of pipe, and what trade the mills lacked in the smaller pipe sizes was more than made up in the increased demand for the larger sizes. Water lines in the west also required large tonnages, and further development along this line is looked for next year.

There were many changes in pipe prices through the year, a discount of 80 off on merchant sizes of steel pipe being the record low price for the year by some of the independent mills. While the production of pipe through the first half of the year was far below last year's record, the great increase in the demand during the last three months of the year overcame this shortage and was sufficient to place the year ahead of 1903.

The new tube plant under erection at Lorain, O., by the National Tube Co. will be placed in operation shortly after the first of the year, while it is estimated that it will require fully another year to complete the extensive improvements undertaken at McKeesport. It was believed that the Lorain plant would be in operation about the middle of the past year, but the many delays encountered in the erection of such a large plant prevented this.

The Youngstown Iron Sheet & Tube Co., Youngstown, O., is adding a 16-in. mill, while the Seamless Tube Co. of America has a plant under erection at Monessen, Pa., to produce seamless boiler tubing by the Briede patents. It is claimed that this tubing can be manufactured much cheaper than the ordinary seamless, and for a very little more than welded material. Owing to the large number of pipe mills in this country, competition continues keen, and with the Lorain plant in operation, production will be considerably beyond requirements.

Rails.

With the beginning of the new year the rail mills will have orders on their books for about 600,000 tons of standard sections, and the outlook for heavy buying during the first quarter of the year is excellent. But for the large amount of foreign business done by all the mills throughout the year, the output would compare very unfavorably with that of recent years. So far as the Canadian market is concerned that is completely shut off with a tariff of $7 a ton, and with the European mills seeking the foreign trade of the world with a powerful association, the outlook for foreign business, outside of Mexico, during 1905 is anything but bright. It is doubtful if any reduction in the price of rails from $28 would have resulted in an increased domestic tonnage, and as the improvement of the iron trade during 1905 was almost assured by the greatly increased demands during the last three months of the year, it was not surprising that no change in prices would be made during 1905. The first large order placed as usual was that of the Pennsylvania Railroad Co. It called for only 102,000 tons, however, as compared with 202,000 the previous year.

During the year the Tennessee Coal, Iron & Railroad Co. has become a formidable competitor for all Southern business, and the Lackawanna Steel Co., with its new mill, also had to be reckoned with. Next year the Republic Iron & Steel Co. promises to roll rails at Youngstown, O., as early as July, and if the pool is to be kept intact another division of the allotment will have to be made.

The rerolling mills have been at the mercy of the leading rail mills the entire year. When orders for standard sections were not forthcoming the mills turned their attentions to lighter sections, and in seeking the business price did not prove to be a very important factor. A few contracts for 25 to 40-lb. sections were taken during the summer months at $18.50 Pittsburg, and even at the close of the year these sections were quoted at $4 a ton below standard sections. Most of the light rail mills, when compelled to meet this competition shut down, and before they had an opportunity to place their plants in operation, re-rolling rails advanced to such high points that it is not profitable to convert at the prices ruling at present. So far as the light rail trade is concerned the large mills have it under their control, and only when they relinquish their hold to look after an abnormal demand for standard sections will the rerolling mills again have an opportunity of securing such prices as prevailed several years ago.

Nails and Wire Products.

With the production of rods in the hands of a few strong mills, also having their finishing departments for the production of all kinds of wire products, and with rod prices on such a basis that the spread between the raw and finished product is small, it can readily be seen that the wire trade is firmly held by a few large interests. However, they do not work together very well except to conserve their own individual interests, and these outbreaks resulted in upsetting the market a number of times during the year. Until July prices were pretty well maintained. All the mills were then anxious for business and all made concessions. At a meeting they held in Chicago they tried to limit these concessions to $2, but they no sooner agreed to this than still deeper cutting was reported. In August the American Steel & Wire Co made a deep cut in all products, $4 on nails, $5 on plain wire and $7 on barb wire. This was followed by still lower prices made by a few independents, but were soon withdrawn. The control of the Western trade also proved a bone of contention. The American Steel & Wire Co. is encroaching upon the territory of the Colorado Fuel & Iron Co. in the West, while the latter is forcing its product east with the aid of favorable freight rates. In the South the Alabama Steel & Wire Co. attempts to curb the American Steel & Wire Co. and whenever any of the interests are hard up for tonnage a slashing of prices follows. Towards the close of the year slightly better prices prevailed, with practically all mills on in full.

Sheets and Tin Plate.

It was a prosperous year for the tin plate trade, although wage disturbances threatened trouble early in the year. The American Sheet & Tin Plate Co. learned to its own satisfaction that certain independent manufacturers were enjoying privileges granted by the Amalgamated Association which in some instances amounted to a reduction from the regular wage scale of 25 percent. A demand was made for a reduction of 20 percent and after numerous conferences and special conventions the tin workers agreed to an 18 percent reduction and the sheet workers accepted an additional reduction of 8 percent, this in addition to the 10 percent reduction that became effective the first of the year. The American Sheet & Tin Plate Co. was prepared for trouble with its tin workers. All of the warehouses of the company ware stocked with plate, the entire stocks carried at one time totaling 1,000,000 boxes. After the wage matters were settled the stock was heavily drawn upon to meet current demand and was soon exhausted.

The production of tin plate will fully equal if not exceed the total of 1903. Throughout the first half of the year the tin plate mills of the combination as well as many independent manufacturers operated at almost their full capacity, while during the last three months of the year from 80 to 95 percent of the mills of the combination were in operation. During the last week of the year 225 of the 242 mills of the company were on in full, and the remaining mills would be in operation but for the fact that they are off for repairs, etc. At the beginning of the year the American Sheet & Tin Plate Co. operated 260 tin mills but these were reduced during the year by the dismantling of the Middletown, Ind., plant, containing 6 mills, and the dismantling of the Champion mill at Muskegon, Mich. The Lisbon, O., plant, containing 7 mills, was recently sold and will be used for rolling copper. One mill was added to the National works at Monessen, leaving a total of 242 at the end of the year.

The independent tin plate producing capacity was increased by the operation of the five mills of the Standard Tin Plate Co., Canonsburg, Pa., and the six mills of the Follansbee Bros. Co., at Mahan Station, W. Va. A number of the other independent tin plate projects that were under way the previous year fared badly for various reasons. The plant of the Jackson Iron & Tin Plate Co., Clarksburg, W. Va., was shut down owing to receivership proceedings. This plant contains eight mills. Other tin plate works that were idle at the end of the year with no immediate prospects of resuming operations are the following: Marietta Sheet & Tin Plate Co., Marietta, O., 4 mills; Juniata Steel & Iron Co., Greencastle, Ind., containing 6 mills; Atlanta Tin Plate Co., Atlanta, Ind., 4 mills; Morgantown Tin Plate Co., Morgantown, W. Va., 5 mills. This makes a total of 27 inoperative tin plate mills while other independent manufacturers operate 91 mills.

Tin plate quotations fluctuated considerably from $3.60 a box in January to $3.45 in February. In July a further reduction of 15 cents was made and the discount increased from one to two percent. In November an advance of 15 cents was made and in December prices were advanced to $3.50 net, almost the same price as prevailed at the beginning of the year. The wage settlement with the Amalgamated Association called for an 18 percent reduction with a reduction of the card rate from $4.20 per box to $3.40, with a two percent advance for every advance of 10 cents a box. The wage reduction on rebate tin plate was reduced from 25 to 12½ percent at the urgent request of the tin workers.

The sheet trade on the other hand keenly felt the trade depression and until the last quarter of the year there was little profit for either the American Sheet & Tin Plate Co. or the independent manufacturers. At the beginning of the year the Amalgamated Association consented to a reduction of 10 percent on sheets and the following April another reduction of 8 percent was made at the urgent demand of the American Sheet & Tin Plate Co. This scale was later adopted for the ensuing scale year. The base was also reduced to 2.30c, but as sheets did not sell above this price the entire year the sheet workers never enjoyed an advance under the new arrangement. A few sales of sheets were made as low as 2 cents for 28 gauge during the month of September, but the market rallied the latter part of the year with 2.30c the prevailing quotation at the close.

The American Sheet & Tin Plate Co. has approximately 163 sheet mills, while at Sharon, Pa., where there are twelve mills, a continuous sheet mill is being installed. The mill will consist primarily of eight stands of rolls, and will be a modification of the continuous tin plate plant on the South Side, Pittsburg. The same ideas are being practically carried out with the exception that the mill will be adapted to the rolling of sheets instead of black plate for tinning purposes. The roughing will be done by continuous machinery as in the continuous tin mill, while the finishing will be done by hand. The mill consists of a continuous heating furnace, continuous roughing mill of six stands, automatic matcher, continuous mill of two stands with tables and automatic doubler. Between the stands of rolls are conveying tables for passing the sheets from one set of rolls to another. By this process the cost of rolling sheets will be very materially reduced.

The Follansbee Bros. Co., Mahan Station, W. Va., placed two sheet mills in operation during the year, while the Alle-

AVERAGE MONTHLY PRICES OF IRON AND STEEL PRODUCTS AT PITTSBURG, 1904

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Bessemer Pig Iron	$ 13.60	$ 13.35	$ 13.85	$ 14.10	$ 13.60	$ 12.60	$ 12.50	$ 12.65	$ 12.75	$ 13.35	$ 15.25	$ 16.65
No. 2 Foundry Iron, Northern	13.35	13.10	13.85	13.75	13.00	12.50	12.35	12.50	12.60	13.25	15.85	16.85
Gray Forge Iron	12.75	12.75	13.25	13.00	12.75	12.25	12.00	12.00	12.00	12.50	14.50	16.00
Bessemer Billets, 4 x 4 inches	23.00	23.00	23.00	23.00	*a* 23.00	*a* 23.00	*a* 23.00	*a* 23.00	19.50	19.50	21 00	21.00
					22.00	21.50	21.00	20.00				
Rails	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
Beams and Channels 3 to 15 inches	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	1.40c	1.40c	1.40c	1.50c
Tank Plate	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	*b* 1.40c	*b* 1.40c	*b* 1.40c	*c* 1.50c
Steel Bars, Bessemer	1.30c	1.30c	1.35c	1.35c	1.35c	1.35c	1.35c	1.30c	1.30c	1.30c	1.30c	1.40c
Bar Iron	1.30c	1.35c	1.40c	1.40c	1.30c	1.25c	1.25c	1.25c	1.25c	1.35c	1.45c	1.65c
Muck Bar	25.00	25.50	26.00	26.50	25.00	24.25	24.00	24.25	23.75	24.50	26.50	28.25
Iron Skelp, Grooved	1.45c	1.50c	1.50c	1.55c	1.45c	1.45c	1.40c	1.35c	1.40c	1.40c	1 55c	1.65c
Steel Skelp, Grooved	1.30c	1.35c	1.40c	1.45c	1.35c	1.35c	1.30c	1.25c	1.25c	1.25c	1.40c	1.50c
Sheets, No. 28	2.20c	2.30c	2.25c	2.30c	2.20c	2.15c	2.10c	2.10c	2.05c	2.15c	2.20c	2.30c
Tin Plate	3.60	3.45	3.45	3.45	3.45	3.45	3.30	3.30	3.30	3.30	3.45	3.55
Wire Nails	1.85	1.85	1.90	1.90	1.90	1.90	1.90	1.60	1.60	1.60	1.70	1.75
Iron Cut Nails	1.70	1.70	1.70	1.70	1.75	1.75	1.75	1.65	1.60	1.60	1.70	1.85
Plain Wire	1.75	1.75	1.80	1.80	1.80	1.80	1.80	1.45	1.45	1.45	1.55	1.60
Ferro-Manganese	45.00	44.00	43 00	42.50	41.50	41.00	40.50	41.00	41.00	41.00	42.00	44.50
Furnace Coke at Ovens	1.45	1.50	1.55	1.50	1.45	1.40	1.40	1.40	1.40	1.45	1.85	2.15
Foundry Coke at Ovens	1.85	1.90	2.00	1.95	1.90	1 85	1.80	1.85	1.85	1.90	2.25	2.60

a—Quotations nominal, concessions from $1.00 to $3.00 per ton. *b*—Plates over 24 in. wide; narrower, 1.30c. *c*—Plates over 14 in. wide; narrower, 1.40c.

gheny Steel & Iron Co., Avenue, Pa., added one and the Interstate Steel Co. at the same place added two. The Myersdale Sheet Steel Co., Meyersdale, Pa., is also installing two sheet mills, while the plant operated by Neal Bros., Pittsburg, was sold for shipment to Buckhannon, W. Va. The National Enameling & Stamping Co. has just placed orders for the erection of six additional mills which will be in operation about the middle of the year.

Coke.

Curtailed iron production of course reduced coke manufacture, and as the furnaces were blown out during the summer months, ovens in the Connellsville region were shut down. At one period nearly 11,000 ovens were idle, and this continued for nearly three months in July, August and September. However, the resumption of blast furnaces in the last three months necessitated the firing of all available ovens and less than 3,000 were idle at the close of the year. Prices have not averaged up well and for furnace coke the average will not be much higher than $1.40, although higher prices have prevailed, while on foundry coke the average will be close to $2. A number of new operations came in during the year, and the Frick Coke Co. added 500 ovens and has 500 under construction. Many of the independent steel interests that sought coal properties outside of the Connellsville region for coking purposes have been compelled to go back to the region for coke to average up their own. The Lackawanna Steel Co.'s coking coal property is not up to expectations, with the result that 300,000 tons will be purchased every year for three years from one Connellsville operator. The price for the three years is $1.75 at the ovens. After numerous experiments with other cokes, exacting consumers are drifting back to the Connellsville product, and an era of much higher prices is looked for in the near future. The production of the region for the year will fall short of that of 1903, which was considerably under the banner year 1902.

The Douglasville Iron Co., Douglasville, Pa., has installed new rolls in its mills, which will soon be in operation.

Machine Shop Management.

BY OSCAR E. PERRIGO.

In continuing the subject of machine shop management the endeavor will be to avoid as much as possible the modern tendency toward multiplication of account books, blanks, cards and the like. In practice we are liable to burden ourselves with such a complexity of these things as finally to build up a system costing more for maintenance that it is worth. It is true that any system of benefit must cost something, and it is equally true that any one system will not be suitable for all cases, but must be modified to suit conditions.

The offices are so arranged that the superintendent has a public and a private office. In the public office will be a large table convenient for spreading out drawings, and desks for the superintendent, the two assistant superintendents and the chief inspector, as well as the usual filing cases, cases for technical publications, catalogues, etc. In the large, open room of the office building is ample space and desk room for the purchasing clerk, cost clerk and two bookkeepers or assistants should their services be necessary, and a special enclosure for the time clerk, with a convenient pay window opening into the entrance passageway.

On the wall of the superintendent's public office is fixed a board, which, by the introducing and changing of small plugs, may represent in a graphic manner the progress of the work in the shops. This board is 37 in. wide and 27 in. high, and aside from the headings, etc., is ruled in one-in. squares by white lines on the black surface of the board. The design is shown in Fig. 1. In the center of each square is a 3/16-in. hole. At the left are lettered the headings similar to those given. At the right is formed pockets in which may be placed small cards giving the months. These are used where orders run from one month into another and so on. Over the squares are figures for days of the month. Fitted to the holes is a series of wood or metal plugs, upon the 5/8-in. circular face of which may be gummed discs of white paper bearing the num-

PROGRESS OF ORDERS.

	Day of Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
	Order Rec'd	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	JAN.
	Drawings Ord.	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	FEB.
	Drawings Issued	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	MCH.
	Patterns Ord.	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Patt. Finished	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
ORDERED.	Iron Castings	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Brass Castings	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Forgings	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
ISSUED.	Iron Castings	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Brass Castings	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Mal. I. Castings	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Steel Castings	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Forgings	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Small Stock	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
PROGRESS OF WORK.	Planing	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Boring	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Hvy. Turning	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Small Parts	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Gear Cutting	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Ready to Erect	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Erected	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Painted	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Inspected	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Ready to Ship	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

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FIG. 1—PROGRESS BOARD.

bers of the orders in the works. These plugs are moved daily from one hole to another as the work advances. Should it be desirable to leave a continuous record of the day of the month on which an order arrived at each stage of progress, or passed through a certain department, there should be four

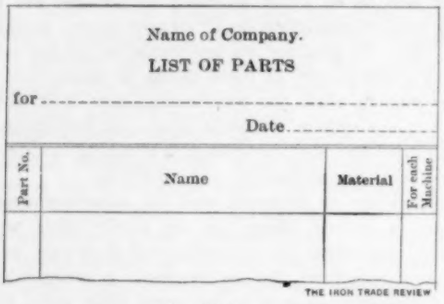
Name of Company.
LIST OF PARTS
for
Date
Part No. | Name | Material | For each Machine
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FIG. 2—SIZE, 5½ x 8½ IN. COLOR, WHITE.

or more columns of holes for each day of the month, and a sufficient number of plugs with the order number indicated upon them to leave in the several holes as the work advances.

The board shown is intended for regular orders for lots of machines or of assembled portions of them carried along together. A similar board may be used for tracing the progress of job or experimental orders. It will be the duty of the cost clerk to make regular daily rounds of the shops, preferably early in the forenoon, and note down in a small book carried for that purpose the facts necessary to make the

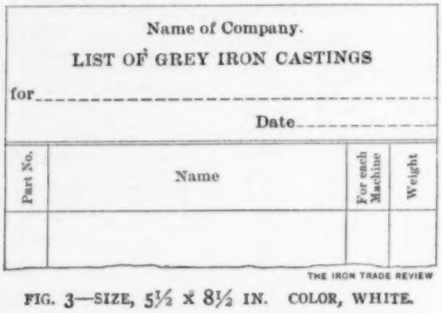
Name of Company.
LIST OF GREY IRON CASTINGS
for
Date
Part No. | Name | For each Machine | Weight
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FIG. 3—SIZE, 5½ x 8½ IN. COLOR, WHITE.

changes on the board and on his return to the office to change the plugs to represent the progress of the work. The writer saw this plan used in a plant that included a number of buildings, some of them at quite a distance from the superintendent's office, and realized what a saving of time and annoyance it was and how many necessary questions it answered during the day.

Handling Correspondence.

The correspondence of the superintendent's office will usually be of a limited nature and relate chiefly to quotations

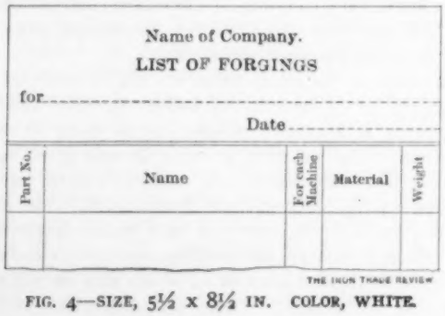
Name of Company.
LIST OF FORGINGS
for
Date
Part No. | Name | For each Machine | Material | Weight
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FIG. 4—SIZE, 5½ x 8½ IN. COLOR, WHITE.

and purchase of materials. Letters of the purchasing clerk will be signed by the superintendent. All correspondence with the general office will be by the superintendent, although he may refer such parts as he desires to heads of departments, through the assistant superintendent having charge of them. Matters in reference to work done in and about the plant by outside parties should be arranged by correspondence, the nature of the work clearly specified, and if practicable a price should be fixed by the parties doing the work, and provision made for any extra work that may be found necessary. No contract for this class of work exceeding $50 should be valid until approved from the general office.

All matters that can be conveniently typewritten should be done in that manner. The practice of taking letterpress copies of letters and other matter sent out is clumsy and involves too much subsequent labor. Replies to letters should

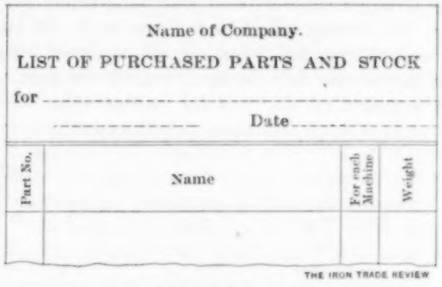
Name of Company.
LIST OF PURCHASED PARTS AND STOCK
for
Date
Part No. | Name | For each Machine | Weight
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FIG. 5—SIZE, 5½ x 8½ IN. COLOR, WHITE.

be duplicated by carbon attached to the answered letter and filed by the simple and efficient vertical system.

The superintendent's orders to the shop will be made in triplicate when the work is done under the jurisdiction of both assistant superintendents, each having a copy. These should be written in a carbon copy book with an indelible pencil. This book should be 5½ in. x 8½ in. of white paper, and have the proper leaves perforated for removal. Each leaf has a printed heading containing the name of the firm or company, the words "Superintendent's Order," a date line, and numbered consecutively in triplicate. These orders as given will contain the order number of the general office, and those made by the superintendent for small jobs to be made from drawings should specify drawing numbers for identification, and the general office numbers if ordered from that source.

Shop Forms.

Orders to the shop which affect the entire force, such for instance as a change in the hours of work, for shutting down

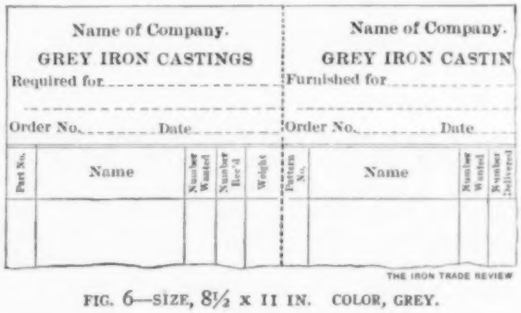
Name of Company. | Name of Company.
GREY IRON CASTINGS | GREY IRON CASTIN
Required for | Furnished for
Order No. Date | Order No. Date
Part No. | Name | Number Wanted | Number Rec'd | Weight | Pattern No. | Name | Number Wanted | Number Delivered
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FIG. 6—SIZE, 8½ x 11 IN. COLOR, GREY.

the works for repairs or holidays and similar matters will be a separate series, typewritten and carbon copies made for posting near the time clocks. They will be consecutively numbered and denominated "General Orders." The assistant superintendents will use carbon copy books similar to that used by the superintendent, but of pink paper, for their orders to the foremen. These orders should have the name of the company and the heading "Shop Orders, First Division," and "Shop Orders, Second Division," according to whether they are to be used by the first or second assistant superintendent. A date line should be added, with sufficient space for the

usual rubber stamp. Each assistant superintendent will carry one of these books with him so as to be prepared to write an order at any time or place necessary.

The foremen should have similar books, 4 in. x 6 in. in size, and of light blue paper, headed with the name of the company, the words "Foreman's Order.....Dep't." and date line. Whenever drawings do not sufficiently explain the work to the workman, or in the absence of drawings, the foreman will invariably make a written rather than give a verbal order. This order is retained by the workman as his authority for the work in case there may follow any question in relation to its correctness. And this idea will be followed all the way through, not endeavoring to remember things that are proper subjects for record, not burdening the mind with dates, sizes, amounts, etc., but recording them, writing them down, stamping a name and a date upon them and placing them on file, where they may be conveniently referred to in case any question arises. The carbon copy books may be conveniently used for sketches as well as written matter, and often with more comprehensive meaning. A good sketch with dimensions can scarcely ever be made to mean what was not intended. Sometimes writing is weak in this respect, particularly if carelessly done.

The superintendent, assistants, foremen, clerks and all others requiring use of name, date, approval, receipt, and similar matters should be provided with rubber stamps. They should date every blank, sketch or memornadum that passes through their

Name of Company. FORGINGS

Required for_____

Order No. _____ Date_____

Part No.	Name	Material	Number Wanted	Number Rec'd	Weight

Name of Company. FORGINGS

Furnished for_____

Order No._____ Date_____

Part No.	Name	Material	Number Wanted	Number Rec'd

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FIG. 7—SIZE, 8½ X 11 IN. COLOR, LIGHT BLUE. (THE LAST COLUMN AT RIGHT SHOULD BE "NUMBER DELIVERED.")

hands unless it already bears a stamp of even date, and it will be safer to do so then, the name being stamped as well as the date.

The regular routine method of passing orders through the works, and the books and blanks necessary for carrying out these methods will be as follows, it being understood that many of the smaller parts of the machines being manufactured are made in large numbers and turned into the finished parts store room, from which they are drawn on proper requisitions when needed for assembling.

Orders for Machines and Parts.

Orders are supposed to be given by the general manager for complete machines, usually in lots of varying numbers according to the size of the machines and the requirements of the market. The superintendent's orders will ordinarily be for groups of parts. For instance, in building lathes the general manager orders a lot of 25 of 24-in. swing. The superintendent makes orders for 25 head stocks, tail stocks, carriages with rests, aprons, etc. Then for 25 beds complete and of different lengths as specified by the general office order, and later on orders the lot, or certain parts of it, as may be necessary, to be erected and made ready for final inspection.

Copies of the superintendent's order will be given to each of his assistants. The first assistant will make his order to the drawing room, pattern shop, stock room, foundry and forge shop and will see that the necessary drawings go to the second assistant; that the patterns go to the foundry; that material is furnished on the foremen's requisitions; that the foundry makes the castings and that the forge shop gets out the forgings. Small castings and forgings may already be complete in the finished parts store room ready for use in assembling. Malleable iron, steel, brass and bronze castings are considered as purchased stock or material if the establishment is not equipped for making them. In consequence, the purchasing

Name of Company. MATERIALS.

Required for_____

Order No._____ Date_____

Amount	Material	Cost

Name MAT

Furnished for_____

Order No._____

Amount	

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FIG. 8—SIZE, 8½ X 11 IN. COLOR, LIGHT GREEN.

clerk will order them, receiving the proper patterns from the pattern shop. The storekeeper will receive and receipt to the purchasing clerk and issue them to the proper departments with an invoice of their numbers, weights, cost, etc. The information for making the orders for stock, materials and purchased parts is derived from the drawing room which furnishes lists of parts of the different machines as well as of the different kinds of material used in their manufacture. These lists are on white paper 5½ in. x 8½ in. As many sheets are used as may be necessary and fastened together with the staple binder. There should be a sufficient number of copies made to supply one copy to the superintendent, each assistant and each foreman doing work on the parts and requiring them, as well as to others as the superintendent may require. Those going to the foremen may have unnecessary sheets omitted. For instance, the foreman of forge shop will not want a list of castings, etc.

Requisition Forms.

The list of gray iron castings here shown is followed by that for malleable iron, steel, brass and bronze castings, and these by the list of forgings, specifying materials, and lastly by the list of purchased parts and materials. As these lists

Name of Company. PURCHASED PARTS

Required for_____

Order No._____ Date_____

Part No.	Name	Number of Pieces	Cost

Name PURCH

Furnished for_____

Order No._____

Pattern No.	N

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FIG. 9—SIZE, 8½ X 11 IN. COLOR, YELLOW.

are quite similar for the several machines, as for instance, a series of lathes differing principally in the size, the matter may be nearly all printed. Materials from which forgings are to be made may be briefly marked thus: WI wrought iron, CS cast steel, TS tool steel, etc.

The blank shown in Fig. 5, will include bolts, nuts, washers, cap, gib and set screws, sheet brass and steel, brass tube, square and round cold rolled or drawn machine steel, tool steel, and similar stock.

The first assistant superintendent will have made out the order to the foreman of the foundry for gray iron castings on the form in Fig. 6. The blank is perforated down the center. The right hand portion is torn off and sent to the foundry. The other half is used to check the number of pieces and weights as the castings are received. Their weight will be added to the material card.

The requisition for forgings is Fig. 7. This is filled out in duplicate, the first half being retained to check receipts of forgings upon and the second half is sent to the foreman of the forge shop as his authority for doing the work, for which stock will habitually be stored in the forge shop, having been delivered in bulk by the storekeeper and charged. It is to be checked on forgings delivered, each lot bearing its proportion of waste according to the job and stock used. A special account of this stock is kept by the storekeeper, charging additions and crediting with forgings turned out.

Name of Company.

MATERIAL AND COST CARD.

Order No._____ Date,_____

Stock	Weight	Cost	Stock	Pieces	Weight	Cost
G. I. Castings						
Mal. "						
Steel "						
Brass "						
Bronze "						
Babbitt						
Meh. Steel						
Cast "						
Tool "						
Wt. Iron						
Pattern Lumber						
Box "						

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FIG. 10—SIZE, 5 X 7 IN. SIX-PLY CARD BOARD. COLOR, LIGHT RED.

The requisition for materials is Fig. 8. This is filled out in duplicate and sent entire to the storekeeper, who retains the first half and sends the second half with the materials where they are ordered by a note at the bottom of the first half. He fills in the costs for the guidance of the foreman to which it is sent.

The requisition for purchased parts, parts that are purchased in a finished or nearly finished condition for use, is Fig. 9.

Before the job starts in shop a stout card is prepared to receive the costs of material and labor expended upon it. The front of this card is shown in Fig. 10. The card has a list of the usual materials given in one column, while the other is left blank for the other articles used. The weights, number of pieces and the cost, as shown by the storekeeper's invoice received with the articles is also written in by the foremen. The back of card shows time spent on the job as per Fig. 11.

This time the foreman obtains from the employe's job cards, registered in the time clock as hereafter described. This material and cost card will go with the work from one department to another, receiving its additions of material and labor account as it passes along and furnishing, when the job is completed a correct material and labor account of the work, and is turned in to the cost clerk.

These blanks are made of different colors to assist in their ready identification, as it is well known that colors appeal to the sight much quicker than does the printed heading. The

Name of Company.

TIME ACCOUNT.

Order No._____ Completed_____

Department	Amt.	Department	Amt.

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FIG. 11—THE TIME ACCOUNT.

colors of the different blanks are so arranged that similar colors do not appear in the same department for different purposes. The blanks are arranged to suit regular printer's sizes of paper, which is usually 17 in. x 22 in., and cardboard, which is 22 in. x 28 in. It is not necessary or advisable that all blanks shall be of a uniform size, although there should be no more different sizes than necessity or convenience demands. They may be ruled horizontally for convenience in

Week Ending_____

No._____

Name

Day	Forenoon		Afternoon		Overtime		Lost Time
	In	Out	In	Out	In	Out	
MON.							
TUE.							
WED.							
THU.							
FRI.							
SAT.							
SUN.							

Total Time_____ Hours _____

Rate_____

Total wages for week _____

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FIG. 12—SIZE, 3⅜ X 5½ IN. STRAW COLORED CARD BOARD.

writing if desired, but many prefer them plain, particularly in the smaller sizes.

Labor Accounting.

It is now proper to describe the method by which labor is accounted for. There is in vogue in the different shops of the country many and various styles and forms of time cards for recording the time of employes on different jobs of work

or on different operations on pieces of the same job. A large majority of these require the employe to do some writing upon them. This is disagreeable to the men and frequently not correct. It is difficult to tell why a man does not want to make out a time card, but every shop man knows the fact well enough, and all have heard men growl about it and say, "I'm a machinist, not a bookkeeper or a clerk," and if they don't swear aloud they are apt to think it, and that injures their efficiency just as much. Various registering clocks have been devised to remedy these difficulties and to a greater or less degree they have helped matters quite a good deal. One of the most practical of these is that called the International Card Recorder. In this clock a card is dropped into a receptacle, a lever depressed and as a bell rings the actual time to the minute is printed on the time card in a space alloted to it. The changes from A. M. to P. M. as well as that from day to day are performed automatically by the clock mechanism. A lever operated by the workman changes the position of the card from "in" to "out" according as the man is beginning or quitting work. The cards are of sufficient length to contain a week's record, and special spaces are provided for overtime. They are made out by the timekeeper and placed in the "out" rack on Saturday after the men have quit work. They have the workman's name and number at the top and are kept in a special rack or case at the side of the clock from which the workmen approach it, so that they may each take the proper card out of the case, step to the clock, stamp the hour, pass to the case on the opposite side of the clock and drop it into the case there. Over these cases are placards bearing the words "Day Time. IN." and "Day Time. OUT." One of these time cards is Fig. 12.

At the end of the week the cards are dropped into a box marked "Day Time," and placed under the "Out" case and the timekeeper takes them up when leaving cards for the next week, and after computing the time he fills out the amount due each employe and enters it in his roll book. The time cards may be had in all colors. In this case we will use straw color for the day time cards, and for job time a different color for the employes of each department using the same clock. There should be a sufficient number of clocks to allow one clock to each hundred employes, or less, if the distance from their department renders it necessary to avoid too much loss of time in registering job time.

Distribution of Time.

To ascertain the proper distribution of the time among the different classes of work, or different parts of a machine, or even the different operations on a single part, job cards are used by the workmen in addition to the day time card. They are of a distinctively different color and are made out by the foreman under whom the employe works. These cards give at the top the workman's name and number and specify the work he is engaged upon. He "rings in" this card when he begins work on a job and "rings out" when the job is completed. The foreman sees that he is supplied with a new card to "ring in" when he "rings out" the former one. When a man is running two or more machines on different orders there are as many separate cards as there are order numbers, all "rung in" and "rung out" as if there were but one. The time clerk divides the time accordingly. If one of these machines is much larger than the other and requires much more of a man's time, as for instance, a 60-in. and a 24-in. planer, the job on the larger machine must be charged in proportion. It sometimes happens, however, that in the above case the smaller planer, if on short cuts, will consume the more time. This is a matter for the foreman to determine and advise the timekeeper. If a workman is on a job from day to day he uses the same job card, dropping it into the box marked "Job Completed" on Saturday night, and receiving a new job card Monday morning. There might be still another box marked "Job Continued," but the number of boxes would, perhaps, cause confusion. In our case this is avoided by the foreman's stamp, "Completed," when the job is finished. If the job is completed during the day the workman will have the foreman stamp his job card before dropping it in the box. The object of this arrangement for job cards is that the timekeeper may compute the time shown on them and ascertain if it aggregates the amount shown by the day time card by which he is paid. The job time cards are kept in racks or cases similar to those used for the day time cards, the placards over them being lettered, "Job Time Only. IN." and "Job Time Only. OUT."

The timekeeper transfers the amounts on the job cards to the job time book which is ruled up as in Fig. 13. This book may be used as a monthly instead of a weekly account if desired. This account of job time will be a check against the foreman's account given on the material and cost card which goes with the work through the different departments, and is finally turned in to the cost clerk, who may also compare it with the storekeeper's account of stock, material and purchased parts issued and charged to the different departments.

Name of JOB TIME | Company | For the week ending

No.	Name	Rate	JOB NUMBERS																			Total

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FIG. 13—SIZE OF BOOK, 9 X 12 IN. FOLDS ON CENTER LINE.

Defective Material and Spoiled Work.

More or less spoiled work will turn up from time to time; some parts or articles of stock or material will be lost and cannot be accounted for; some that will be found defective; and some parts rejected by the inspector. To replace these will require separate consideration and treatment from the routine manufacture. In the case of the manufacture of small parts in quantity, to be turned into the finished parts store room, the count, as they go from one department to another, will be lessened as parts are spoiled or rejected and the cost per piece will be correspondingly increased. But in case a certain number of parts are required to be made on an order we must devise a means for the issue of stock and material to replace that defective, lost, spoiled or rejected, and under proper safeguards to prevent misuse. This will be by a special requisition, signed by the foreman of the department and approved by the assistant superintendent, specifying what is wanted and the reasons why it is required, that is, to replace defective material, spoiled or rejected parts, etc. This requisition should be made in duplicate, one copy retained

by the storekeeper and the other filled out with the costs and sent with the articles to the department requiring them. Fig. 14 is the form to be used.

In filling out this blank the words "Defective Material, Spoiled Material, Lost Material, and Rejected Parts," that are not needed may be erased by drawing a line through them.

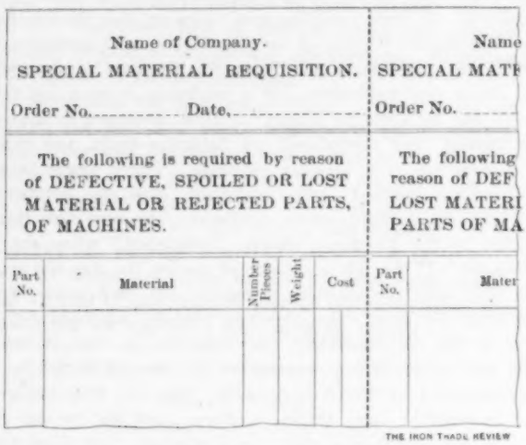
Name of Company.
SPECIAL MATERIAL REQUISITION.
Order No. Date.
The following is required by reason of DEFECTIVE, SPOILED OR LOST MATERIAL OR REJECTED PARTS, OF MACHINES.
Part No. | Material | Number Pieces | Weight | Cost
Name
SPECIAL MATE
Order No.
The following reason of DEF LOST MATERI PARTS OF MA
Part No. | Mater
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FIG. 14—SIZE, 8½ x 11 IN. COLOR, BRIGHT RED.

These articles will be charged by the foreman on the material card and to the labor account, adding so much to the cost of the work.

We will now consider consumable stock, material, tools and supplies and how they are to be treated. Coal for boilers, for cupolas, for forge shops; coke for foundry and forge shop, charcoal for forge shop; wood, etc., will be purchased in large quantities, as will also, molding sand for foundry and stored for use. Returns of amounts used will be made to the cost clerk weekly. This return for fuel is on Fig. 15. The weekly return for molding sand, etc., will be similar form. These are filled out in duplicate, one part being retained by the department from which it comes.

Consumable stock, materials and tools for the different departments are drawn on requisitions made in duplicate, one part retained by the storekeeper and the other returned with the articles as an invoice, by which method each foreman may know the expense in his department for these articles, as well as the expense of each of his men in this respect. By consumable articles is meant, of course, waste, oil, files, brushes, emery and emery cloth, and all similar articles issued by the storekeeper and consumed or worn out in the shop. Fig. 16 is the blank. These requisitions will not be sent to the store

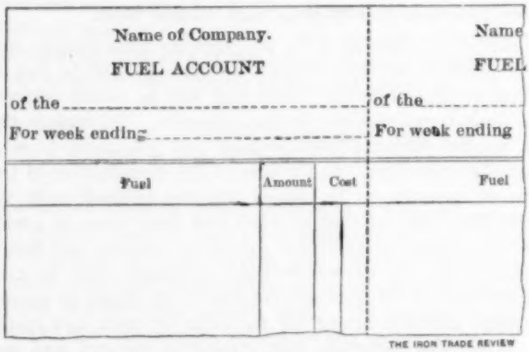
Name of Company.
FUEL ACCOUNT
of the
For week ending
Fuel | Amount | Cost
Name
FUEL
of the
For week ending
Fuel
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FIG. 15—SIZE, 5½ x 8½ IN. COLOR, CHOCOLATE.

room by the workmen, but by an errand boy, who may profitably be employed in one large, or two or three small departments.

It will have been noticed that little has been said in this article as to the form of books to be used. The reason is that with the exception of such as have been described, they are the ordinary ones that need no special mention, and the proper ones will readily suggest themselves. The manufacturers of the time clock mentioned herein furnish a very compact and useful form of pay roll ledger in which the names of employes need be written only once in three months. The "loose leaf" system will be found very convenient for the bookkeepers.

Cincinnati Machinery Market.

CINCINNATI, Jan. 3.—The closing month of the year 1904 was the best in point of new orders among the machine tool manufacturers. There has been an improvement in domestic as well as foreign trade. The shops begin the new year with enough orders in hand to keep them busy and the universal comment is that 1905 presents a most encouraging prospect. During 1904 the falling off in domestic business and the general depression in the machine tool industry encouraged efforts for the development of foreign business which had been neglected in the boom period preceding. These efforts are now being rewarded. It is also noted that machinery jobbers who had previously declined to interest themselves in foreign business are now seeking to make a market for machine tools abroad.

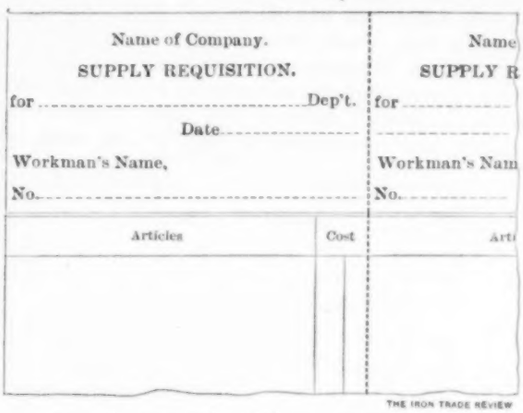
Name of Company.
SUPPLY REQUISITION.
for Dep't.
Date
Workman's Name,
No.
Articles | Cost
Name
SUPPLY R
for
Workman's Nam
No.
Arti
THE IRON TRADE REVIEW

FIG. 16—SIZE, 5½ x 8½ IN. COLOR, MANILA

The high state of efficiency and expansion of local shop facilities which was developed during the activities of 1903 left but little opportunity or necessity for further additions to shop equipment. However, the increasing use of high speed steels has made the machines of greater power imperative in order to utilize completely the new advantage. The use of high speed steel has tended to increase output and machines are being driven at higher speed in all of the shops than a year ago. Many of the manufacturers of this city employ the premium plan, and where this system is in vogue employes use the high speed steel up to capacity. In other shops where men are paid a fixed wage rate there is no disposition to disparage or combat the use of these tools, but naturally the increase in output depends upon the efficiency of the workman. Reports are to the effect that oftener than otherwise machines are driven up to full capacity, but we hear of instances where shop managers did not believe it good policy to drive the machines to the limit. There can be no doubt that the introduction of high speed steels has increased the output of the shops, without making it necessary to provide additional machinery. It is interesting to note that machine tool builders are constructing machines which are adapted to the use of high speed steel and that in this construction work a certain kind of steel is adopted as the standard, and the machines are built with a view to using that particular make.

December orders in a general way called for prompt delivery, but in some instances the manufacturer was asked to defer shipment and invoice until after Jan. 1, in order that the purchase might go into the record and account of the purchaser in the new year. It is not expected that January will be an active month in point of orders as that is the annual stock-taking time, when traveling men are in assisting in such work, and in conference with the heads of concerns, and the time in which the policies, probable expenditures, and the general plan of business procedure for the year is outlined.

Foundation work is under way on the new plant of the Cincinnati Engine & Pump Co. at the corner of Cook and Alfred streets. The lot is 90 x 122 ft. and the plans call for a three-story structure. The company is to engage in the manufacture of fire engines.

The Lodge & Shipley Machine Tool Co. reports decided improvement in orders, with the outlook for 1905 extremely gratifying.

The John Steptoe-Shaper Co. enjoyed a heavy month's business in December and states that January shipments will be very heavy.

The Rahn-Mayer-Carpenter Co. notes continued improvement in demand for lathes.

The Cincinnati Machine Tool Co. is now thoroughly established in its new building and with a decided increase for orders for drills during December, the year closed satisfactorily with the company.

The Cincinnati Milling Machine Co. reports an unusually heavy month in point of orders in December, and the company is finding difficulty in turning out their machines rapidly enough to satisfy customers.

The Cincinnati Planer Co. enjoyed a decided improvement in the closing months of 1904 and is now busy.

Monthly Prices of Iron and Steel Products.

In the following table, which we take from the *Bulletin* of the American Iron and Steel Association, are given the average monthly prices of leading articles of iron and steel at Philadelphia and Pittsburg in 1903 and 1904. The prices named are per ton of 2,240 pounds, except for bar iron, which is quoted by the 100 pounds. At Philadelphia prices of bar iron are quoted from store but at Pittsburg from mill. At Philadelphia the prices given for bar iron are in all cases net. Prices of No. 1 anthracite foundry pig iron at Philadelphia are preserved for comparison with former years, this grade of pig iron having been the standard grade from 1842 until the present time. The original table gives prices on Bessemer pig iron and Bessemer billets, but these are covered in our own tables which appear elsewhere.

Months	Old iron T rails, at Phila.	No. 1 foundry pig iron, at Phila.	Gray forge pig iron, at Phila.	Gray forge pig iron, at Pittsburgh	Best refined bar iron, at Phila.	Best refined bar iron, at Pittsburgh
January, 1903....	$23.50	$24.00	$20.50	$20.50	$2.20	$2.00
February	23.75	23.75	20.00	20.50	2.20	2.00
March.	24.50	23.50	19.50	20.87	2.20	2.00
April	24.90	22.70	19.10	20.45	2.20	2.00
May..	24.50	21.37	18.62	19.87	2.16	2.00
June....	23.50	20.62	18.00	18.87	2.08	1.77
July	22.00	19.00	17.50	17.90	2.01	1.70
August	19.37	18.00	15.81	16.04	1.93	1.70
September	18.75	17.50	14.94	15.25	1.81	1.70
October	17.50	16.70	14.05	14.20	1.81	1.70
November..	16.37	16.00	13.75	13.00	1.71	1.34
December	15.40	15.85	13.75	12.80	1.71	1.30
January, 1904.....	15.87	15.50	13.50	12.81	1.71	1.30
February	15.00	15.50	13.50	12.75	1.71	1.31
March.	16.70	15.45	13.50	13.17	1.71	1.38
April	18.37	15.75	13.75	13 09	1.71	1.50
May..	15.85	15.40	13.55	12 62	1.71	1.50
June.....	14.50	15.19	13.31	12.27	1.71	1.50
July	14.12	14.94	13.12	11.92	1.71	1.50
August.....	14.55	15.00	13.00	11.89	1.71	1.50
September	15.50	15.00	12.87	11.75	1.71	1.50
October..	16.25	15.12	13.19	12.30	1.71	1.50
November..	17.70	16.40	14.75	14.25	1.71	1.52
December.....	20.25	17.62	16.00	15 85	1.81	1.76

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The John G. Duncan Co., Knoxville Tenn., whose building, office and stock were recently destroyed by fire is in new quarters and the owner of the building which the company occupied will rebuild at once. The company desires best dealers' prices on wood working machinery, portable engines on wheels and sills, traction engines from 6 to 20 h. p., both new and second hand.

The Hygienic Floor Machine Co., Utica, N. Y., has been incorporated with a capital of $5,000. The company will manufacture a device invented by G. William Goodier, one of the directors, for cleaning polished and tiled floors.

The Acme Mfg. Co., Sioux City, Ia., has been incorporated with a capital of $6,000. The company will manufacture a tire bolt wrench and a wheel stand. It has a patent on the wheel stand and has applied for a patent on the wrench. The two articles are intended to facilitate work on tires of all kinds of wheels. The company expects to erect a plant.

The John Lauer Machine Co., Detroit, Mich., has been incorporated with a capital of $50,000, all paid in. Incorporators are: John Lauer, William J. Ashton, John P. Lauer and Peter Lauer. The company will manufacture machinery and tools of all kinds.

The Milwaukee Heating Co., Milwaukee, Wis., has been incorporated with a capital of $30,000, to manufacture furnaces and heating apparatus. Incorporators are: Hubert J. Rock, George Linder, and John Reich, all of Milwaukee.

The Interstate Iron & Steel Co., Chicago, has been incorporated with a capital of $400,000. Incorporators are: Benjamin B. Morris, H. M. Goldsmith and H. D. Levy.

The D. W. Payne Controller & Engineering Co., New York City, has been incorporated with a capital of $48,000. Incorporators are: E. P. Hampson and W. A. Robinson, of New York, and D. W. Payne, of Elmira.

The Standard Machine & Supply Co., Columbus, O., has been incorporated with a capital of $15,000. Incorporators are: Sarah D. Standish, George E. Standish, Carrie E. Standish, Minnie E. Thompson and John E. Fergus.

The Union Fire Arms Co., Toledo, O., has been incorporated with a capital of $200,000. Incorporators are: John Wiskenhiser, J. H. Householder, A. B. Tillinghast, G. B. Colton and G. E. Rouse.

The Atlas Pneumatic Tool Co., Fostoria, O., has been incorporated with a capital of $100,000. Incorporators are: E. W. Allen, M. M. Carr, M. M. Thomas, C. B. Hall and F. C. Veon.

The Youngstown Furnace & Supply Co., Youngstown, O., has been incorporated with a capital stock of $50,000. Incorporators are: Leon Geschwind, F. H. Jennings, Alvin Rice, Fred Mattmueller Jr. and L. H. Young.

The Ecker Pressing Machine Co., Chicago, has been incorporated with a capital of $12,000, to manufacture machinery and hardware. Incorporators are: Jacob Ecker, Louis Ecker and William Zoeller.

Fires and Accidents:—

The Peru Steel Casting Co., Peru, Ind., sustained a loss of $150,000 on the night of Dec. 20, in the destruction of its large plant, excepting four of the smaller buildings. The plant comprised five large buildings, one 600 x 80 ft., and nine smaller structures. The company was organized in 1901, with Philip Matter, of Marion, as president, and G. A. Swartwout, of Peru, general manager. The capital stock originally was $200,000, but later was raised to $600,000. At first the company employed 100 men and manufactured car couplers and other railroad castings. The business grew until in less than

a year 600 men were employed. Two years ago there was a change in the management and the amount of work decreased until 200 employes were at work and finally the plant was closed entirely. It is feared that the plant will not be rebuilt. Because of the crippling of the fire department of Logansport, Ind., by sending engines and men to the Peru fire, the implement store of E. M. Watts & Co., Logansport, burned for an hour unchecked, causing a loss of nearly $50,000.

The foundry of the Canadian Copper Co., Copper Cliff, Ont., was completely destroyed by fire Dec. 20. Many patterns were destroyed. The ruins are being cleared preparatory to rebuilding.

The plant of the Fleetwood Foundry & Machine Co., Fleetwood, Pa., was damaged by fire Dec. 21. The warehouse was saved. Loss, $12,000.

Solomon & Co., machinists, Philadelphia, sustained a loss of $22,000 by fire Dec. 21. They are now located at 909 Sanson street.

New Construction:—

The National Sheet Metal Co., Peru, Ill., recently incorporated, has increased the capacity of its plant and expects within a few months to manufacture nickel steel with its patented polish machine, in addition to nickelzinc, brasszinc, bronzezinc and copperzinc and nickeltin, brasstin, bronzetin and coppertin; also zinc glazier points. The company expects to increase its last year's output of 600,000 pounds by 400,000 pounds in zinc and tin, and perhaps, double the amount of plated steel. The company intends to build in the spring providing it can dispose of its recent plant during the season.

The Johnson Mfg. Co., Urbana, O., manufacturer of tin and galvanized iron railroad ware, has enlisted new capital and made extensive improvements to its plant. The company also manufactures rural free delivery mail boxes. It has been organized two years and the business has steadily increased.

The report published in Southern newspapers that the Tennessee Coal, Iron & Railroad Co. will enlarge its steel plant at Ensley, Ala., increasing its output 50 percent, is, we are officially informed, without foundation.

The Hecla Iron Works, Brooklyn, N. Y., which recently increased its capital from $250,000 to $500,000, has purchased a plot of ground on which it intends to erect a building. The company is continually adding to its equipment in order to keep in the lead in the market. It is a close corporation and the capital stock is held entirely by people who are employed in the concern. The company has recently issued two handsome pamphlets—one giving views of the city of New York and of the Hecla Iron Works plant and the other, views of New York's sub-way, showing stations and other construction erected by the Hecla Iron Works.

The Elmira Heater Co., Elmira, N. Y., is placing on the market a cast iron sectional boiler. The company has had its product manufactured for it, but has decided to erect its own foundry and do its own pattern work, foundry and machine work; also do any job work that may come to it.

The Southern Metal & Mfg. Co., St. Louis, Mo., will erect a foundry at Litchfield, Ill.

The Hoefer Mfg. Co., Freeport, Ill., has completed the erection of its new plant. The main building is 120 x 60 ft., three stories with an L 42 x 60 ft., along the Illinois Central tracks. On the first floor are located the office, pattern room and general machine shop. In the L are located the blacksmith shop, store room and japanning room. On the second floor is the machine shop, where the higher grade of machinery is manufactured and special machines built. The line of machinery built by the company includes drill presses, power metal saws, horizontal drilling and boring machines, vertical boring machines and special machinery.

The Maryland Car Wheel Mfg. Co., Cumberland, Md., recently incorporated with a capital of $25,000, will erect a plant for the manufacture of a self-lubricating car wheel. The charter also calls for the manufacture of various kinds of cars and mining supplies. Incorporators are: John Duroth, the inventor; Conrad G. Smith, John T. Edwards, Conrad Housroth and James Thomas.

Jackson & Edwards are erecting a large building at Greencove Springs, Fla., for the manufacture of turpentine tools. The firm will be known as the Turpentine Tool Mfg. Co.

The shops of John Thompson & Co., Beloit, Wis., recently destroyed by fire, will be rebuilt. The forge department was but little damaged and work in that part of the plant has already been resumed.

Janson Bros., who will remove their plant from Oxford, N. J., to Columbia, Pa., have purchased five acres on which to build their new plant. The first building to be erected will be about 100 x 40 ft., which will be used for the operation of a merchant and bar iron mill. Employment will be given to 300 men.

The Hoxie-Kells Machine Co., Florence, Ala., has secured the manufacturing right for a patent guard and will install machinery for its manufacture; also add enough iron working machinery to equip a first-class machine shop for manufacturing special work. The Sheffield Rolling Mill will make the special rolls and roll the steel for the guards. An addition will be built to the plant in the spring.

Machinery is now being installed in the shops of the Santa Fe Railroad at La Junta, Colo., which has just been completed by C. A. Fellows, of Topeka, Kas., who had the contract. These buildings, which have cost about $500,000, will be equipped and put into operation Feb. 1. The shops will employ about 800 men.

The foundation has been laid for the addition to the plant of the James Leffel Co., Springfield, O. A large part of the tools and machinery for the equipment of the general shop has been ordered by General Manager Sparks.

The Milwaukee Coke & Gas Co., Milwaukee, Wis., will increase the capacity of its plant by the addition of 40 ovens. Work on the new equipment will commence this month.

The American Pulley Co., Philadelphia, will erect in the Spring, a building 50 x 150 ft.

The Sumter Machinery Co., Charleston, S. C., will soon start the erection of foundry and machine shop buildings.

The Lackawanna railroad will begin this week to move to the new shops at Keyser Valley, near Scranton, Pa.

A new water power plant to be located on the banks of the American River at Alta Station, 60 miles from Sacramento, Cal., by the Central California Electric Co., will have the highest head of any in existence. The plant will have a capacity of 25,000 horsepower and the water after passing the present pumping station at Alta will be carried by a canal to a point where a drop of 2,100 ft. can be obtained. The Platt Iron Works, Dayton, O., will design the hydraulic machinery.

The Carthage Grain Door Co., Carthage, Co., recently incorporated, will manufacture a patent grain door for freight cars. A building will be purchased or erected for the use of the company.

The Catawissa Car Foundry Co., Catawissa, Pa., has been absorbed by the Pennsylvania Car Works, which will put the plant in operation early this year.

The A. B. Farquhar Co., York, Pa., has recently taken an order for 30 horsepower traction engines for a firm which send them to Egypt for general farm use.

The properties of the Coxey Steel & Silica Sand Co., Mt. Vernon, O., have been sold by the receiver to H. N. Hills, of Gambier, who is acting as agent for the Imperial Co., a concern composed of Eastern men. The price paid was $275,000.